

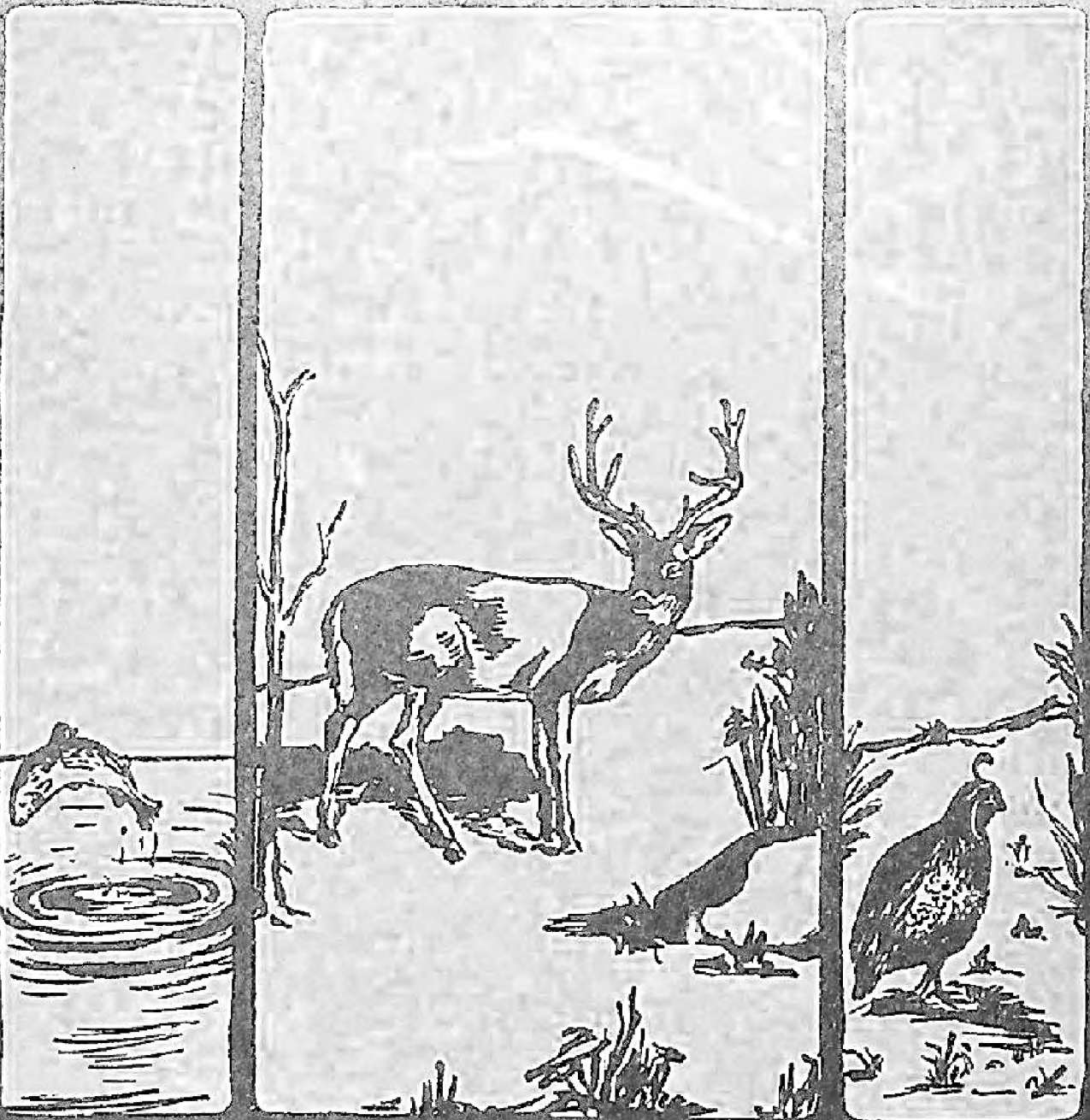
CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 25

San Francisco, July, 1939

Number 3



STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND GAME
San Francisco, California

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SAN FRANCISCO, JULY, 1939

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CALIFORNIA FISH AND GAME is a publication devoted to the conservation of wild life. It is published quarterly by the California Division of Fish and Game. All material for publication should be sent to Richard S. Croker, editor, California State Fisheries Laboratory, Terminal Island, California.

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ONE HUNDRED ISSUES OF "CALIFORNIA FISH AND GAME"

By RICHARD S. CROKER
Editor, "CALIFORNIA FISH AND GAME"

Since its founding, the aim of the California Division of Fish and Game has been the furtherance of wildlife conservation by familiarizing the public with the reasons for our fish and game regulations rather than acting simply as a policing organization. As part of its program of education, the quarterly magazine, "CALIFORNIA FISH AND GAME," was started twenty-five years ago, and since that time it has carried on the principles laid down by its first editor, Harold C. Bryant, namely, the promotion of conservation through education by presenting facts about fish and game and their management. As the official publication of the California Division of Fish and Game, this magazine has carried many articles of lasting interest in the field of wildlife conservation, articles written not only by staff members of the Division but by other leaders in fish and game management work.

A review of the first issue, which was dated October, 1914, gives us an idea of what fish and game conditions were twenty-five years ago. Then, as now, the articles in "CALIFORNIA FISH AND GAME" reflected the efforts made to preserve our wildlife and indicated trends in fish and game abundance and utilization.

In 1913 and 1914 the headline news in game conservation was the effort to prevent the sale of wildfowl in the markets of California. The first two articles in the introductory issue dealt with this subject. In the field of fish conservation the most important (and controversial) move was the closing of Catalina Island waters to net fishing, and an article in this initial number discussed the subject. Several other articles on conservation rounded out the issue, along with short notes and editorials as well as statistical reports. The issue is different from later ones principally in that most of the articles were of an editorial nature rather than the results of research work.

Because the first issue marked a milestone in the battle to conserve our wildlife for generations to come, we believe it would be of interest to summarize and quote from the articles appearing in it in this, the one-hundredth issue. Many of our readers do not possess a copy of the initial number, and those who have one probably have forgotten its contents.

OUR PROGRAM

This dedicatory editorial outlined the program to be followed by the Fish and Game Commission in furthering "conservation through education," particularly by means of the new publication. The editorial in full:

There are two ways of enforcing laws—one is to punish violators, and the other is to educate people to a realization of the need and value of the law so

that public sentiment demands its observance. The former method was used in the time of Nero and still needs to be used for the laggards of civilization. The relative value of the "rule with an iron hand" and the "rule with reason" has been too often discussed to use space for it here. The thing to be noted is that the California Fish and Game Commission is beginning a campaign of education in an endeavor to so educate public opinion that protective laws may in the future become relatively unimportant. Most of the violators of the game laws, if brought to a real appreciation of the law itself and the need for it, would obey rather than disobey the law.

A department newly formed might well be called a bureau of education and publicity. Dr. Harold C. Bryant, Assistant Curator of Birds in the University of California Museum of Vertebrate Zoology, has been placed in charge of the work. Dr. Bryant is well equipped for his new duties, for not only has he had a long university training, but he has spent several years in research work on the game birds of the state and through extensive traveling is well acquainted with conditions throughout California.

The function of this bureau will be to find ways and means of protecting foreign and domestic game birds within the state and to dispense information relative to game by means of correspondence, public illustrated lectures, and by the issuance of bulletins dealing with the status of fish and game. A study will also be made of the habitats, habits and breeding seasons of the different game birds and mammals of the state so that a basis for sane game laws may be afforded.

As one means of educating the public to the need and value of game conservation the Commission is beginning the publication of a quarterly bulletin devoted to the interests of the fish and game itself, to those who pursue it, and to those who simply take an interest in it as a valuable endowment of the state. Every effort will be made to not only make the publication of interest to every one, but to further, in every way possible, the present day movement for the conservation of wild life. The wild game resources of the State of Maine are said to bring an influx of thousands of people into the state each year and to increase the business of the state to a sum not less than fifteen millions of dollars. California's game resources can be made just as, if not more, valuable to this state. This can only be done, however, by conserving these resources for the use of, not only ourselves, but of those who come after us.

This publication will stand for every measure which will help in conserving our game resources. That fundamental law of game conservation, "the preservation of the needed breeding stock," will be one of the ideals toward which we will work. Such measures as may be urged from time to time may seem rather harsh to some, but it must be remembered that it is high time we were becoming alarmed in regard to the status of our game. We will always endeavor to stand for those measures which are absolutely necessary and which we are sure will accomplish the desired end.

As one of the best measures of conserving California's game we believe in state game refuges and will urge the establishment of game refuges throughout the state.

We believe, also, that the breeding and propagation of game birds and mammals should be encouraged. At the present time there is a demand by hotel keepers for pheasants and they are glad to pay from \$2 to \$3 a piece for them. The market supply is very small at present in this state. Encouragement along these lines would furnish many people with a profitable occupation, and would do much to ease the conditions following the passage of a non-sale law.

Although this quarterly will be the medium of publication used by the State Fish and Game Commission and will often directly express their views, yet, they will not be responsible for the personal opinions expressed by signed writers in the periodical.

The Commission is anxious to give publicity to the work which they are doing. Reports, financial and otherwise, will be appended so that full knowledge as to the source and amount of their revenues and the nature of their expenditures may be known.

The material required for several of the departments is dependent very largely on people interested in game conditions in different parts of the state. The success of these departments depends very largely upon the interest which people will take in furnishing material for them. If deer are rapidly decreasing

in your county, will you not write up a note and send it to the editor? If you discover the nest of a grouse or other game bird, will you not take careful notes as to position of nest, kind of material, number of eggs, and date on which found, and offer it to us for publication? Heretofore, much valuable information regarding our game has been lost forever simply because no notes were taken and no permanent records made. Remember that records of occurrence and nesting depend upon three important items—exact location, date and observer. Keep on the lookout for interesting observations and good photographs for "California Fish and Game."

A BRIEF HISTORY OF THE NON-SALE OF GAME IN CALIFORNIA

By HAROLD C. BRYANT

This article was inspired by the passage in 1913 of a law prohibiting the sale of wildfowl and the subsequent nullifying of the law by referendum. The subject was hotly debated at the legislature, and market hunters and hotel men nearly defeated it. They were more successful with a referendum and had the bill referred to a vote of the people. Dr. Bryant outlined reasons for supporting the "nonsale" bill in the impending election.

SOME NOTES ON THE NON-SALE OF GAME

By ERNEST SCHAEFFLE, Executive Secretary, Fish and Game Commission

Mr. Schaeffle discussed further the advantages of a "nonsale" law and urged its passage in his short article.

It seems strange to us twenty-five years later that there should ever have been any argument at all over the merits of prohibiting market hunting; we now take it for granted that the game is for the sportsman. It is interesting to note that the election held after the publication of these articles went the wrong way by a narrow margin, so that ducks and geese would have legally remained on the market had it not been for the newly enacted federal migratory bird law. This law was later voided by a court decision, and not until the enactment of the treaty with Canada in 1918 were waterfowl protected from the market hunter. The State law prohibiting the sale of wildfowl was not passed until 1923.

EFFORTS TO CONSERVE THE GAME AND CONTROL THE VIOLATOR

By FRANK M. NEWBERT, President State Fish and Game Commission

In this brief article Mr. Newbert outlined the objectives and achievements of the Fish and Game Commission. His closing paragraph means as much today as it did then:

With such an efficient force at command we are enabled, to a degree, to carry out the ironclad rule of this Commission, and that is to accomplish the greatest good for the greatest number. To conserve the fish and game, to increase the supply, to prohibit wanton destruction, and to restrict fishing and hunting to the taking of what is necessary to the individual, is the aim of this Commission.

OUR RESPONSIBILITY FOR THE PRESERVATION OF THE GAME AND FISH

By HON. FRANK M. RUTHERFORD

Mr. Rutherford contributed an inspiring editorial on conservation of wildlife. He cited the case of the antelope and predicted that without proper laws and public support our other wildlife would follow the antelope to oblivion. He wrote in part:

Every citizen and resident of the state should take an interest in the protection and preservation of the game birds and animals. They are the property of all the people, and the state is endeavoring by legislative enactments to give all an equal show in pursuing and taking game, under such restrictions only as are proper for the preservation of the game. The efforts of the state and the efforts of the Commission are ineffectual without the co-operation of the people.

There is no other subject, perhaps, upon which legislation has been so prolific of dissatisfaction as upon regulating the taking of fish and game, no other subject upon which prejudices apparently arise so easily and about which is made so much adverse criticism—not only criticism, but base insinuations and false accusations.

FISH AND GAME CONSERVATION DEPENDENT ON CONSERVATION OF OTHER NATURAL RESOURCES

By EX-GOVERNOR GEO. C. PARDEE

The legislature, at its 1913 session, created a Water Commission, "with power to see to it that the water resources of the state shall be conserved, that is, used at such times and in such quantities and under such conditions as the public necessities for power, irrigation, domestic purposes, etc., may require, but without unnecessary waste, and without monopoly detrimental to the public." This was also a controversial subject and the passage of the bill was fought by "an association of power and water companies." This group succeeded in having the measure placed on the ballot as a referendum.

Mr. Pardee outlined the dependence on water of both game and fish and pointed out that conservation of water resources is necessary for the conservation of wildlife. He urged that the people vote in favor of the commission to conserve water resources.

ATTEMPTS TO PROTECT THE SEA FISHERIES OF SOUTHERN CALIFORNIA

By CHARLES FREDERICK HOLDER, *Throop College of Technology, and President of the Wild Life Protective League of America*

Due to the efforts of Mr. Holder and his associates a sport fishing reserve was created at Santa Catalina Island in 1913. In this article, the longest in the issue, Mr. Holder traced the history of the Tuna Club and the fight to prohibit net fishing in Catalina waters, quoting letters from such prominent men as Hugh M. Smith, Gifford Pinchot, Joseph Grinnell, George F. Kunz and David Starr Jordan. He also told of

the improvements in fishing conditions noted in 1914. The bitter language of this article reflects the hard feeling that existed then between sport fishermen and commercial fishermen—a feeling which unfortunately has not improved much. Twenty-six years after the closure of Catalina waters the battle still rages to close more areas and to reopen those already closed, and with many more fishermen operating in southern California—both anglers and market fishermen—the clamor is even louder than in 1913 and 1914.

The article is of great interest in that it gives a summary of fishing conditions in the early days, as well as listing the rules of the Tuna Club that were in effect in 1914. One of the photographs shows a proud angler with six marlin, aggregating 976 pounds, his “world’s record” one-day catch—proof that the commercial fishermen can not always be blamed for such depletion as occurs.

BIRD LIFE AS A COMMUNITY ASSET

By JOSEPH GRINNELL, Museum of Vertebrate Zoology, University of California

This article is of such nature that it would be worth while to repeat it in its entirety:

Students of natural history have become fully aware that as the country is settled marked changes take place in its bird life. A few of our species, such as the linnet and mockingbird, have become more numerous than they were in the early days. But very many more have become noticeably scarcer; some have disappeared altogether. Bird life as a whole has diminished in quantity to an alarming degree.

Those who have made a scientific study of our bird life have come to the conclusion that it has a distinct value to human interests. This value consists first of all in the well established economic bearing of birds upon agricultural interests; 90 per cent of our birds occupy an important position in maintaining the balance of nature, by which they serve to check abnormal increase in plant-eating insects and excessive multiplication of weeds.

Then there is the dollars-and-cents value of game birds—not in their market value, because we believe that market hunting will soon be a thing of the past—but because their pursuit, whether by the shotgun exponent or camera hunter, involves large commercial dealings through transportation and equipment. It is believed that a very large value pertains to bird life as an object of pursuit for whatever purpose, because this pursuit leads to wholesome pleasure and hearty outdoor exercise on the part of many people who live otherwise sedentary lives.

There is, again, that refreshment to the mind resulting from contemplation of birds as possessors of pleasing form and plumes, cheerful manner, and attractive song. This brings an active appreciation on the part of the majority of mankind. In this role, birds at large have an important esthetic value.

Another point to be considered is the principle that to allow complete extermination of any living thing is out of harmony with an enlightened consideration of the future. Our successors will not approve of our thoughtlessness in completely destroying the California condor any less than we deplore the wanton destruction of the great auk by our ancestors. In other words, it is now generally recognized as ethically wrong to jeopardize the existence of any animal species.

Yet one more value of our bird life, and one which I urge as being worthy of most serious consideration, namely, the inherent value of birds in educational work with children. We hear nowadays of all sorts of systems—the Montessori, for example—which are designed to hasten the development of alertness and precision in exercising the senses. Can any objects be better adapted for just such purpose than birds—with their multifarious colors and color patterns, their variety in form, their quickness and peculiarities in movement, their range of voice. And, of all the systems of early education, this is the

primitive one, the one most in accord with the normal development of the child, because of long standing, ancestrally.

When we come to weigh together all these valuations—economic, esthetic, educational—is there justification for anyone's claiming that attention to conservation of bird life is of trivial importance? Is this subject not most emphatically worth the consideration of thrifty, busy people?

I must insist that conservation of bird life is of equal import with that of any of our other natural resources. It is dollars-and-cents economy, not only to stop waste but to take steps to maintain an optimum of value as regards *THIS* asset—in other words, to maintain a large principal, upon which an undiminished income can be realized as time goes on.

What steps are to be taken to keep our bird population so that it may serve its highest usefulness to mankind? I believe that it *IS* feasible to maintain it, and I am not arguing from a sentimental standpoint, either, but from a utilitarian standpoint.

Some of the factors correlated with the settling up of the country, and which are adverse to the persistence of an abundant native bird population are—first, in my opinion, the ravages of the house cat. No matter how well fed your tabby may appear, she is by nature a nocturnal marauder, gifted through keenness of hearing, eyesight, scent, and unquenchable instinct to search out and destroy young and old birds. I am confident that an enormous annual toll upon bird life in our suburban districts is exacted by the house cat. In the country, where it is known that many cats have gone wild, they constitute a big factor against the birds. There is abundant proof to support this assertion in the experience of those of us who tramp the hills and bottom lands in quest of facts and laws of wild life interrelationships.

The second most important factor over a large part of the country is the invasion by the English sparrow. This interloper appropriates food and shelter rightfully belonging to the native birds, and sooner or later crowds them out. Southern California is now in a critical period, in that the English sparrow has but recently arrived. If we are to prophesy subsequent history from that which has been repeated over and over again in the eastern states as this bird traveled from east to west, we are doomed to be overrun by English sparrows, unless drastic measures against them be taken at once. Now, while they are still few in numbers, is the time to combat this nuisance effectively.

A third factor is the reduction in food supply due to the reclamation and cultivation of wild lands. This affects our native species of birds inevitably, but it can be counterbalanced to a considerable extent by the use as ornamental shrubs and garden flowers of such kinds of plants as will produce suitable food for the birds. The fourth factor against the birds is the thoughtless destruction of them, for fun, as by the not infrequent gunner who shoots swallows and swifts because they afford a favorable target; to eat, as by [the one] who sees in the smallest bird simply its value as a mouthful of food, to be netted or shot in as great numbers as possible; and by the uninstructed small boy, who robs bird's nests far and wide merely for the exhilaration of discovery and appropriation. Lastly, the exploitation of birds for commercial purposes, to be sold in the market as food, or, worse yet, so that their feathers may serve to adorn hats—still exists to a much larger extent than many of our citizens suppose. The lure of the dollar justifies any means to obtain it that can be devised on the part of certain unthinking members of society. It may not be that the wings of the terns destroyed along our beaches are used in millinery *HERE*. They may be shipped to London and used there as "foreign" birds. But we, in our turn, are catering to bird destruction somewhere else if we buy in our local millinery stores plumes, or wings, or feathers of so-called "foreign" birds.

Every one of the above adverse factors is such as can be either eradicated entirely or can be mitigated to a very large degree. The cat question must be solved by the licensing and control of pet cats and the extermination of homeless ones—precisely the same treatment which is now accorded the dog in most of our cities.

The English sparrow must be dealt with systematically and rigorously. Call the English sparrow a foreign *weed*, if you will, the undue spread of which must be continually fought. We maintain an army of caretakers along our streets and in our parks so that the attractive flowers and shrubs are not choked out. Is it not exactly as good sense to maintain one or more properly

qualified employees in each city to see to it that by trapping or shooting or poisoning—whichever method proves most effective—the English sparrow population is kept down below the point where it is distinctly deleterious to our native birds, even though complete extermination of the pest may never prove possible? The diminution in natural bird food and disappearance of springs can be compensated for privately, and publicly as in parks, by providing food and watering places, just exactly as a lawn or a flower bed may be supplied at regular intervals with concentrated fertilizers, and daily sprinkled. To my mind, the attractiveness of our bird life—in other words, the esthetic feature in its value—warrants consideration for the same reason as the flower garden. Care and attention must be bestowed on both.

Finally, to lessen or remove the factor of thoughtlessness, or ignorance, or commercialism, we have state and federal regulations. These are, at the present time, approaching the ideal. We need, and for the most part now secure, conscientious enforcement of this legislation on the part of our officers of the law. But efforts toward enforcement have often been observed to be futile unless the people at large have been led to see the wisdom in these laws. Hence we must have popular education as to the features and value of our bird life. One natural channel for such education, by which adults as well as children are to be convinced of the facts in the case, is the school, where bird study should be incorporated as an essential element in the grade curriculum.

Our bird life is a valuable public asset and deserves sane consideration as such.

As this issue goes to press we learn with deep regret of the death of Dr. Grinnell, one of the really great men in the field of wildlife research and conservation, and one of the men directly responsible for starting and carrying on this publication. In the next number we will pay tribute to Dr. Grinnell.

* * * * *

In addition to the editorial, "Our Program," already quoted above, the first issue contained six short editorials on conservation, including reviews of books on wildlife. Under the heading, "Conservation in Other States," were seven notes tracing the progress of conservation beyond the borders of California. Short notes on natural history subjects were contained in two sections, "Life History Notes" and "Wild Life in Relation to Agriculture." The reports included seizures of fish and game and a summary of violations for July and August, 1914; mountain lion bounties paid during the years 1907 to 1913 and the first half of 1914; and statements of the expenditures of the Fish and Game Commission for the fiscal year July, 1913 to June, 1914 as well as for the months of July and August, 1914.

The front cover carried a picture of a mountain stream with the caption, "Forests, water power, and wild game are three of California's greatest resources. They are ours to use but not to destroy." The cover that is used today made its first appearance on the second issue of volume one. The outside back cover of the first issue carried an editorial on the nonsale of game. The inside of the front cover listed the officials of the Fish and Game Commission. The set-up of the Commission was quite simple. There were the Hatchery Department (pioneer department of the original Fish Commission), the newly formed Department of Commercial Fisheries and Bureau of Education,

Publicity and Research,¹ the State Game Farm (the old one at Hayward), and the Patrol Service. A list of the officials follows:

F. M. Newbert, President, Board of Fish and Game Commissioners
 M. J. Connell, Commissioner
 Carl Westerfeld, Commissioner
 Ernest Schaeffle, Executive Secretary²
 R. D. Duke, Attorney
 Charles L. Gilmore, Engineer
 W. H. Shebley, Superintendent of Hatcheries
 E. W. Hunt, Superintendent, Tahoe Hatchery
 F. A. Shebley, Superintendent (unattached)
 W. O. Fassett, Superintendent, Humboldt Hatchery
 N. B. Scofield, In Charge, Department of Commercial Fisheries
 W. N. Dirks, Superintendent, State Game Farm
 H. C. Bryant, In Charge, Bureau of Education, Publicity and Research

Of these men, only N. B. Scofield is still with the Division of Fish and Game, and he is due to retire in 1939.

Members of the Patrol Service were listed on the last page of the magazine. The Patrol Service was divided into four divisions: San Francisco, Sacramento, Fresno and Los Angeles. J. S. Hunter, Assistant Secretary for Patrol in 1914 is now Chief of the Division's Bureau of Game Conservation. There were 64 fish and game wardens (then known as deputy commissioners) in October, 1914. Of these, but nine are still with the Division of Fish and Game in various capacities: O. P. Brownlow, F. A. Bullard, M. S. Clark, J. H. Gyger, Henry Lencioni, H. B. Nidever, E. H. Ober, R. C. O'Connor, and R. L. Sinkey.

* * * * *

Such was the pioneer issue of "CALIFORNIA FISH AND GAME." We hope that this summary has been of interest to our readers. In future issues we plan to review briefly the leading articles of "twenty-five years ago," so that in looking forward to improved wildlife conditions we can pause for a glance at "the good old days."

¹The Department of Commercial Fisheries was discussed in an editorial in the first issue of the magazine; for details see pages 251-252 of the current issue. The Bureau of Education, Publicity and Research was described in the editorial, "Our Program," reprinted on pages 206-208 of the current issue.

²Position now known as Executive Officer.

THE ROCKFISH OF THE MONTEREY WHOLESALE FISH MARKETS¹

By J. B. PHILLIPS

*California State Fisheries Laboratory
Division of Fish and Game*

The rockfish, commonly called rock cod, are an important group of fishes in the fresh fish markets of California. For many years, the port of Monterey has led all other California ports in the amounts landed each year. The past 20-year average of approximately 2,000,000 pounds a year of rockfish landed at Monterey represents between 35 and 40 per cent of the State total.

The rockfishes compose a very large family, Scorpaenidae, with about 250 species inhabiting all seas, but especially abundant in the temperate parts of the Pacific Ocean. The family is most numerous represented on our California coast where about 56 species have been reported. Identification of many species is made difficult because of the similarity in form.

Aside from the true rockfish (genus *Sebastes*),² there are three other species belonging to the rockfish family that are caught in California waters, but in minor amounts. These are the sculpin (*Scorpaena guttata*) and the two channel rockfish (*Sebastes alacanus* and *Sebastes altivelis*). Rockfish are found along the entire coast and around the islands, wherever there is a rocky bottom or a rocky bottom nearby. Some species are found in shallow water while others are found down to 300 fathoms. The bulk of the commercial catches are made in 40 to 120 fathoms.

Recording of Market Catch

The Division of Fish and Game of California requires that dealers make out receipts for all fish purchased from fishermen. These receipts, which are in triplicate form, show the date of delivery of fish, dealer's name, fisherman's name, boat identification number, and the weight in pounds of each variety of fish, together with the price paid the fisherman. These receipt books are furnished by the Division of Fish and Game. One of the receipts is issued to the fisherman making the delivery, one is kept by the dealer, and the final one ("pink ticket") is collected by the State.

This ticket system has proven itself invaluable in our statistical investigations on yield and supply of the different market fishes. The one difficult group of fishes is the rockfishes or rock cods. There are so many species found along the California coast and such a similarity in

¹ Submitted for publication, May, 1939.

² Until there is a reclassification of the rockfish family, the true rockfish are considered as belonging to the genus *Sebastes*. To avoid repetition, in this paper, the generic name *Sebastes* is represented by the capital letter S. For example *S. goodei* refers to *Sebastes goodei*.

forms, coupled with a variety of local names that before any statistical analysis within the group is attempted it is desirable to check the market listings against actual observations at the most important ports. This has been done in the present paper for Monterey, the leading port for rockfish landings in California. It is hoped that the present paper will help clear up the confusion at this port in regard to names applied by fishermen, the manner in which the marketmen group the species and the relative importance of the different species or groups of species.

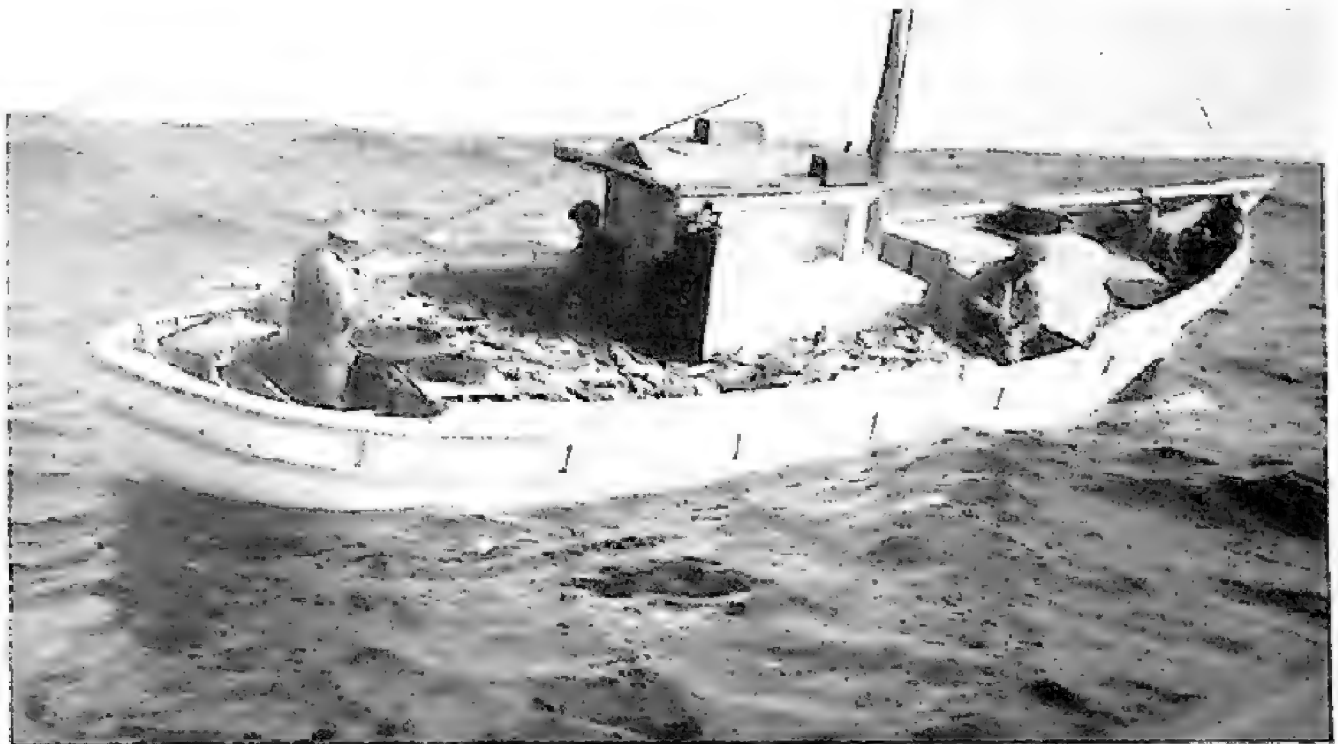


FIG. 78. A representative Monterey jig boat completing a day's set-line fishing for rockfish, off Pt. Sur. The three-man crew took in 3000 pounds on this occasion. The usual number of men on these trips is two, although there are occasional one-man or three-man crews. Monterey boats have been fishing southward to Pt. Sur for rockfish, for many years, and a few boats may spend several days fishing as far south as Pt. Piedras Blancas. Photograph by J. B. Phillips, April, 1938.

Monterey Rockfish

The different species of rockfish are not kept entirely separate when records are made out by marketmen. In most cases, the catches brought in by fishermen have a number of species mixed together, but in some instances the catch may be composed almost entirely of one species with just a few scattered individuals of other species. Although fishermen and marketmen may recognize most or all of the 35 or 40 species delivered at Monterey, it is impractical to keep them separated. The markets lump them into 10 to 15 groups. Some of the groups refer to one species but other groups may include several species. There is a tendency for price to govern the groupings, but this can not be depended upon. For example, the three main groups of rockfish, bocaccio, chili-pepper, and yellowtail rock cod, which represent the bulk of the Monterey landings, usually bring the same price to fishermen. In cases where more than one group have the same price, the group or species that predominates in the catch is listed on the tickets. Although most markets use the same general groupings, there are times when a particular species in a group containing several species is separated and

the form listed by name, if it has one, as for example, "Cefalutano" for the species *S. nebulosus*, one of the gopher rock cod group.

In table 1 is presented a list of the various kinds of rockfish landed at the port of Monterey during a one-year's survey, showing the scientific names of the species observed, the common names authorized by the Division of Fish and Game, the names by which the fishermen know the different forms, and the groupings used by the marketmen.



FIG. 79. Rockfish ("rock cod") being hauled in from a depth of 100 fathoms, off Pt. Sur. Although there may be as much as one mile of set-line with around 3000 hooks to haul up, the more fish there are on the line, the easier the hauling. The lessened pressure as the fish are brought toward the surface allows the gases in the air bladder to expand and increase the size of the air bladder, with the result that the fish balloon upward to the surface. The fish are snapped off the hooks or knocked off on the side of the bin, and any straightened hooks are bent back to shape later. Photograph by J. B. Phillips, April, 1938.

Market Groupings (see table 1)

Analyzed, the market groupings are as follows: **Bocaccio** and **Chili-pepper** each refer, primarily, to one species, *S. paucispinis* and *S. goodei* respectively. **Bluefish** ordinarily refers to one species, *S. mystinus*, but when the young of *S. melanops* are present they are also included here. **Bolina** indicates the one species, *S. auriculatus*. **Yellowtail Rock Cod** represents two species, *S. flavidus* and *S. serranoides*. The former is the true yellow-tailed rockfish and constitutes the bulk of the catch for this group. These two forms look much alike but fishermen recognize a difference and call *S. serranoides*, the darker of the two, the shallow-water yellowtail and associate it with kelp. **Widow Rock Cod** denotes *S. entomelas*, primarily, but some of the markets may include *S. ovalis* and *S. hopkinsi* here. *S. entomelas* may sometimes be included with yellowtail rock cod, while *S. ovalis* is often included with bocaccio or chili-pepper. **Red Rock Cod**³ embraces several forms. Most marketmen break this main grouping into two smaller groups: large red rock cod and small red rock cod. **Large Red Rock Cod** is

³ The name Red Rock Cod does not mean that this group contains all of the basically red colored forms. For instance, the chili-pepper has a bright red color.

composed mainly of two species, *S. pinniger* and *S. miniatus*. Several other species that appear on occasion are also placed in this group. These are *S. ruberrimus*, *S. introniger*, *S. rubrivinctus* and *S. nigrocinctus*. **Small Red Rock Cod** may include not only the young of the large red rock cod group but several other species that never attain a large size, such as *S. rosaceus*, *S. rhodochloris*, *S. diploproa* and *S. proriger*. Some markets may at times include the small of *S. chlorostictus* and *S. constellatus* in this group. The term medium red rock cod is sometimes used by one market to denote the medium sized speci-

TABLE I.

SPECIES OF ROCKFISH FOUND IN THE MONTEREY MARKETS DURING APRIL, 1937-MARCH, 1938,
TOGETHER WITH THE AUTHORIZED COMMON NAMES, FISHERMEN'S NAMES,
AND MARKET GROUPINGS.

Scientific name (S = Sebastodes)	Authorized common name	Fishermen's names	Market listing or grouping
<i>S. paucispinis</i>	Bocaccio.....	Bocaccio.....	Bocaccio*
<i>S. goodei</i>	Chili-pepper.....	Chili-pepper.....	Chili-pepper*
<i>S. flavidus</i>	Yellow-tailed Rockfish.....	Yellowtail Rock Cod.....	Yellowtail Rock Cod*
<i>S. serranoides</i>.....	.....	Yellowtail Rock Cod; Kelp Salmon.....	.....
<i>S. entomelas</i>.....	.....	Widow; Beccafico; Viuva.....	Yellowtail Rock Cod
<i>S. ovalis</i>.....	.....	Widow; Zipola; Viuva.....	Widow Rock Cod*
<i>S. eigentmanni</i> (?).....	.....	Red Widow; Beccafico Rossa.....	Widow Rock Cod
<i>S. elongatus</i>	Striped Rockfish.....	Serena; Rainha; Reina; Strawberry Rock Cod.....	(Small and uncommon)
<i>S. saxicola</i>.....	.....	Occhio-grande.....	Bocaccio or Chili-pepper (small)
<i>S. caurinus</i>.....	.....	Gopher; Barriga Branca; White or White Belly Rock Cod; Palermotana.....	Bocaccio or Chili-pepper (small)
<i>S. vexillaris</i> (?).....	.....	Gopher.....	Gopher Rock Cod*
<i>S. carnatus</i>	China Rockfish.....	Gopher; Cefalutano.....	Gopher Rock Cod*
<i>S. nebulosus</i>	Black and Yellow Rockfish.....	Gopher.....	Gopher Rock Cod*; Cefalutano
<i>S. chrysomelas</i>.....	.....	Gopher; Kelp Rock Cod; Seomoda.....	Gopher Rock Cod*
<i>S. castralliger</i>.....	.....	Gopher.....	Gopher Rock Cod
<i>S. atrovirens</i>.....	.....	Gopher.....	Gopher Rock Cod
<i>S. maliger</i>.....	.....	Gopher.....	Gopher Rock Cod
<i>S. serriiceps</i>	Black Rockfish.....	Bluefish.....	Gopher Rock Cod (uncommon)
<i>S. mystinus</i>.....	.....	Black Rock Cod; Cherna; Nero; Black Bass.....	Bluefish; Black Rock Cod
<i>S. melanops</i>.....	.....	Codalarga; Filiono.....	Red Rock Cod (large and small)*
<i>S. pinniger</i>.....	.....	Barracho; Barrachon; Racha (Rasher).....	Red Rock Cod (large and small); Red Snapper*
<i>S. miniatus</i>.....	.....	Tambor; Drum; Pot Belly; Yecchia.....	Red Rock Cod (large and small)
<i>S. ruberrimus</i>.....	.....	Convict Fish; Shoflies; Spanish Flag.....	Red Rock Cod (large and small)
<i>S. rubrivinctus</i>.....	.....	.....	Red Rock Cod (large and small)
<i>S. introniger</i>.....	.....	.....	Red Rock Cod (uncommon)
<i>S. nigrocinctus</i>.....	.....	.....	Red Rock Cod (small); Scacciatale*
<i>S. rosaceus</i>.....	.....	.....	Red Rock Cod (small); Scacciatale
<i>S. rhodochloris</i>.....	.....	.....	Red Rock Cod (small); Scacciatale; (uncommon)
<i>S. proriger</i>.....	.....	.....	Red Rock Cod (small); Scacciatale; (uncommon)
<i>S. diploproa</i>.....	.....	.....	Widow Rock Cod (uncommon)
<i>S. hopkinsi</i>	Starry Rockfish.....	Chinafish; Scacciatale.....	Chinafish; Scacciatale*
<i>S. constellatus</i>	Green-spotted Rockfish.....	Chinafish.....	Chinafish*
<i>S. chlorostictus</i>.....	.....	Steamer Rock Cod.....	(Small and uncommon)
<i>S. jordani</i>.....	.....	Bolina; Brown Rock Cod; Gar-rupa.....	Bolina; Brown Rock Cod*
<i>S. auriculatus</i>.....	.....	Roosterfish; Cowfish; Gallo; Chefra.....	Cowfish; Bocaccio (uncommon)
<i>S. levis</i>.....	.....	Fingiano; Scorpion.....	Deep Sea Red Rock Cod
<i>Sebastes alascanus</i>	Channel Rockfish.....	.....	.....

* Indicates species comprising bulk of catch for that particular group.

mens of the species included in the two previous groups. **Chinafish**⁴ in the strictest sense applies to *S. chlorostictus* and *S. constellatus*. **Gopher Rock Cod** includes a number of species of small dark colored rockfish. Four species make up the greater portion of this group, *S. caurinus*,⁵ *S. carnatus*, *S. chrysomelas* and *S. nebulosus*. Other species in this group are *S. rastrelliger*, *S. atrovirens*, *S. maliger*, and *S. serripes*. **Cefalutano** represents the one particularly desirable species of the gopher rock cod group, *S. nebulosus*. **Scacciatale** includes two species, *S. rosaceus* and *S. constellatus*, which are classified by some markets in the small red rock cod and chinafish groups, respectively. The few *S. levis* that are caught may be included as bocaccio or they may be listed as **Cowfish** ("cows"), or **Roosterfish**. *S. elongatus* and *S. saxicola* are small species that appear in minor quantities with *S. paucispinis* and *S. goodei*, and may be included with either one. *S. jordani* and *S. eigenmanni* are small forms that are at present of little significance at Monterey. *Sebastolobus alascanus* is caught in rather deep water, when the fishermen are after sablefish. This fish is not particularly desirable, but when it is brought to the markets it is usually classified as **Deep Sea Red Rock Cod**.



FIG. 80. Preparing rockfish trawls for another day's fishing. In set-line fishing a number of the lines coiled in the baskets are fastened together to form one long line. As the line is brought in, each section is stacked in a basket in disorderly fashion (see Fig. 79). Then, on the return to port, each section is coiled in a basket with the hooks imbedded in the outside edge. If fishing is to be resumed the following day, the hooks are immediately baited, so that all is in readiness for the early morning fishing. Photograph by J. B. Phillips, April, 1938.

Proportions of Different Species

To check the actual proportion of the various species of rockfish landed at the port of Monterey, a survey was conducted during the one-

⁴ Chinafish and China Rockfish, *S. nebulosus*, are not to be confused.

⁵ *S. caurinus*, which is listed as occurring northward of California, is presumably replaced by *S. vexillaris* to the southward of Cape Mendocino. However, at Monterey, all the specimens examined, referable to *S. vexillaris*, answer to the description of *S. caurinus* quite closely. When post-mortem color changes are considered, these two forms may prove synonymous.

year period, April, 1937-March, 1938. The wholesale fish markets were visited on the average of twice a week during the above period and an estimate made of the amounts of the different species present. In table 2, these poundages and the resultant percentages are grouped by months and for the one-year period. Each month's percentage was obtained by dividing the total poundage for that month into the poundages for the different species. The year-percentage was obtained by dividing the grand total poundage into the year's total poundages for each species. The total estimated poundage observed during the above period of one year was about 333,000 pounds, or 22 per cent of the 1,475,000 pounds landed at Monterey. The Monterey landings for the above period were approximately 50 per cent of the State total.

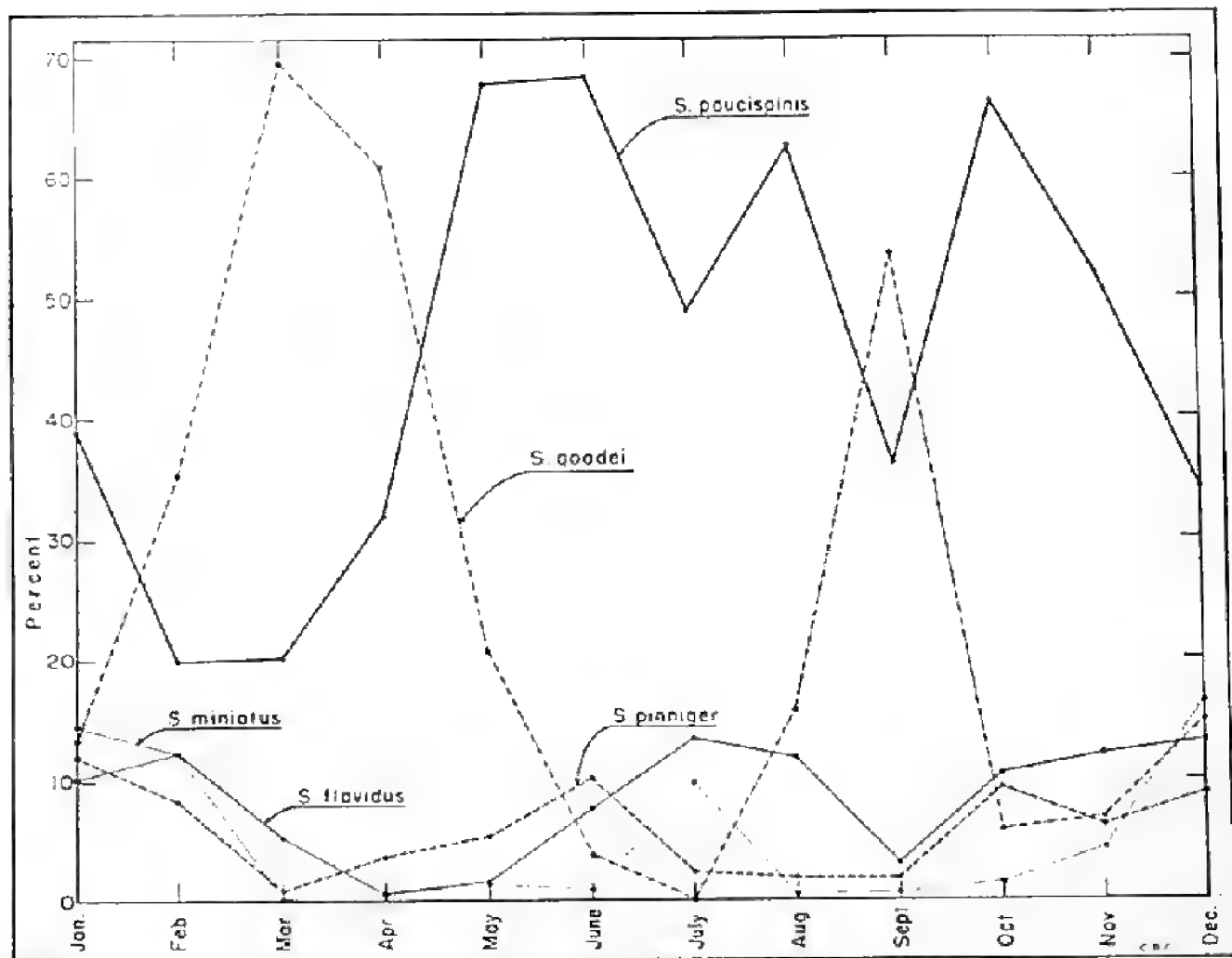


FIG. 81. Monthly landings of the five most important rockfish, at the port of Monterey during the period April, 1937-March, 1938, in percentages of the total rockfish catch.

From table 2 and figure 82, it will be noted that the year's survey showed *S. paucispinis* (bocaccio) to be the most important species at Monterey, with *S. goodei* (chili-pepper) a close second. These two species, between them, accounted for 70.2 per cent of the total landings of rockfish. Next came *S. flavidus*, composing the bulk of the yellow-tail rock cod catch, with 7.9 per cent. Then followed *S. miniatus* with 6.8 per cent and *S. pinniger* with 6.4 per cent, these two composing the bulk of the large red rock cod catch. The foregoing five species accounted for 91.3 per cent of the total year's landings of rockfish at Monterey.

TABLE 2
PROPORTIONS OF THE DIFFERENT ROCKFISH APPEARING IN THE MONTEREY WHOLESALE FISH MARKETS DURING THE PERIOD, APRIL, 1937-MARCH, 1938,
BASED ON THE TOTAL LANDINGS OF ROCKFISH

Species S.= Sebastodes; Sbl.= Sebastolobus	Monthly proportions												Year	
	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Pounds	Per cent
<i>S. paucispinis</i>	38.9%	19.9%	20.1%	31.8%	67.7%	68.3%	48.9%	62.6%	36.2%	66.1%	52.0%	34.1%	130,940	39.4%
<i>S. goodii</i>	13.3	35.3	69.5	60.8	20.6	3.8		15.6	53.6	5.9	6.9	14.9	102,555	30.8
<i>S. flavidus</i>	10.1	12.2	5.2	.6	1.6	7.7	13.5	11.9	3.1	10.5	12.1	13.2	26,267	7.9
<i>S. miniatus</i>	14.5	12.2	.1	.5	1.4	.9	9.8	.5	.6	1.5	4.3	16.3	22,631	6.8
<i>S. pinniger</i>	12.0	8.2	.8	3.6	5.3	10.1	2.4	1.0	1.9	9.3	6.2	8.9	21,400	6.4
<i>S. entomelas</i>	6.8	0.6	2.5	.9	.4	.1	13.7	2.3	.6	1.8	6.7	5.5	12,838	3.9
<i>S. serranoides</i>	.4	.6		.1	.6	.9	5.5	3.3	1.2	.6	3.3	1.5	3,435	1.0
<i>S. chlorostictus</i>	.6	.3	.2	.3	.3	2.7	1.3	.5	.7	1.0	2.4	.8	2,440	.7
<i>S. ovalis</i>	1.2	1.1	.5	.2	.1	.4	1.1	.3	.2	.8	1.0	1.3	2,368	.7
<i>S. ruberrimus</i>	1.1	.4	.1		.4	.8	.3	.4	.2	.2	1.7	1.2	2,052	.6
<i>S. constellatus</i>	.5		.1	.1	.2	.2	.3	.1	.4	.6	.9	.9	1,409	.4
<i>S. rosaceus</i>	.4			.1	.1	.6	1.3	.5	.3	.2	.7	.2	849	.3
<i>S. caurinus</i>														
<i>S. vexillaris</i>				.3		1.0	.1		.1	.1	.7	.1	530	.2
<i>S. mystinus</i>			.3	.2	.1	.7	.8		.1	.6	.2	.1	480	.1
<i>S. elongatus</i>	.1	.1	.3		.1	.3		.1	.1	.1	.1	.2	390	.1
<i>S. carnatus</i>						.4	.2		.1	.2	.4	.1	319	.1
<i>S. auriculatus</i>				.1			.3					.4	318	.1
<i>S. chrysomelas</i>				.2	.7	.1	.2			.2			314	.1
<i>S. rubrivinctus</i>	.1					.6			.2	.2	.2	.1	277	.1
<i>S. rhodochloris</i>									.1			.1	189	.1
<i>S. nebulosus</i>				.1			.2		.2	.1		.1	187	.1
<i>S. saxicola</i>			.2		.1								98	
<i>S. rastrolliger</i>					.1	.1							73	
<i>S. introniger</i>				.1									57	
<i>S. levis</i>				.1	.1								50	
<i>S. maliger</i>						.1							39	
<i>S. atrovirens</i>						.2							30	
<i>S. sorriceps</i>											.2		35	
<i>Sbl. alascanus</i>													15	
<i>S. nigrocinctus</i>													7	
<i>S. hopkinsi</i>													7	
<i>S. melanops</i>													6	
<i>S. proriger</i>													3	
<i>S. diploproa</i>													2	
<i>S. jordani</i>													1	
<i>S. eigenmanni</i>														
Unidentified													10	
Total per cent	100.0%	99.9%	99.9%	100.1%	99.9%	100.0%	99.9%	100.0%	99.9%	100.0%	100.0%	100.0%		99.9%
Total pounds examined	44,224	24,405	18,173	62,515	14,175	3,430	3,070	13,964	36,260	19,443	21,165	66,797	332,630	
Total pounds landed	149,788	128,276	130,164	156,070	32,980	65,036	51,916	111,803	152,065	119,875	159,832	216,857	1,474,737	

70.2% }
91.3%

It was observed that there are seasonal variations in the quantity of the species caught. (See Fig. 81.) Two species that form the bulk of the catch, *S. paucispinis* and *S. goodei* have, in general, a negative correlation. When either of the foregoing species tends to become scarce to fishermen, the catch is bolstered by the other important species, *S. flavidus*, *S. miniatus* or *S. pinniger*.

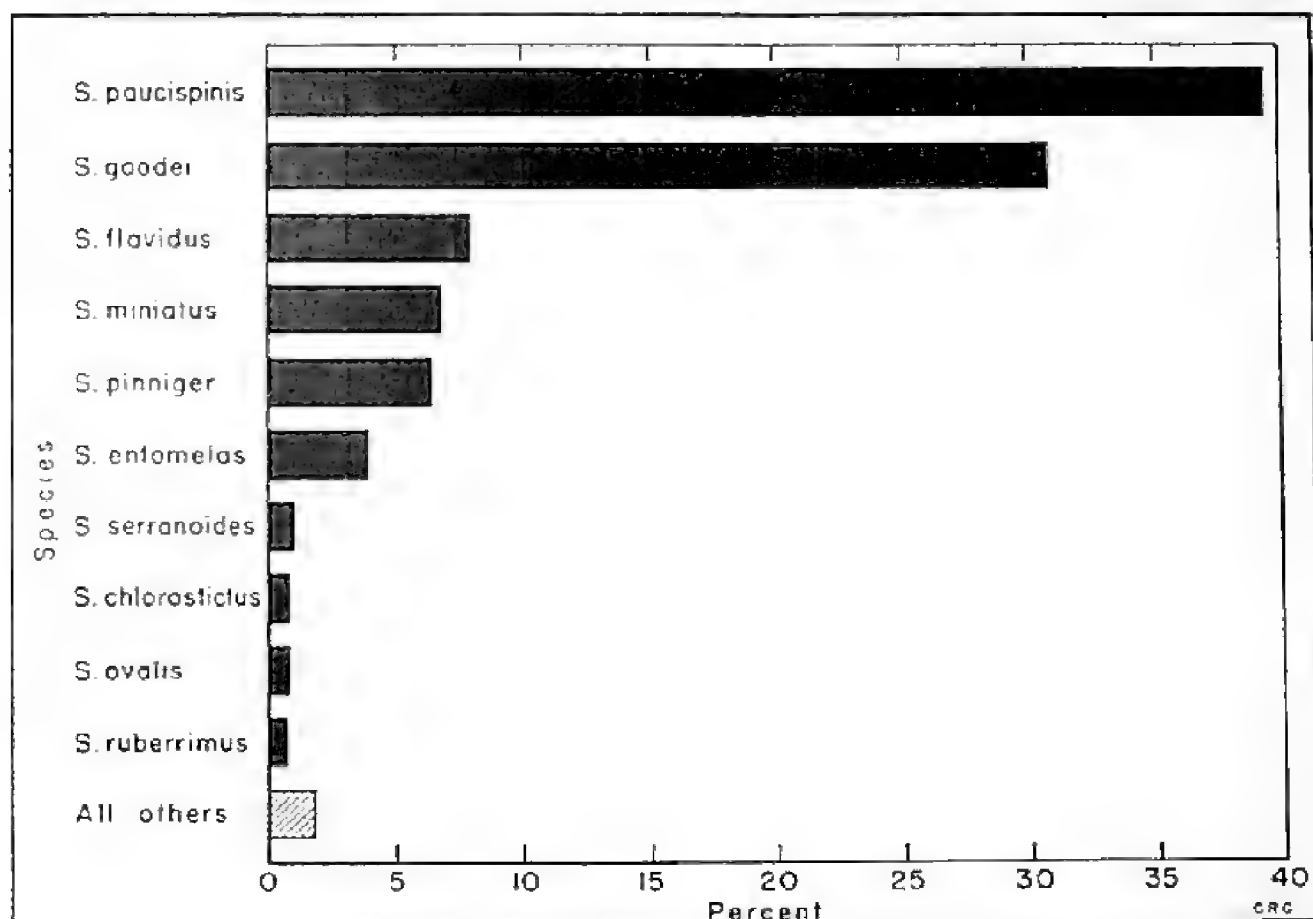


FIG. 82. The most important species of rockfish landed at the port of Monterey for the one-year period April, 1937-March, 1938, expressed as percentages of total rockfish landings observed.

Actual and Listed Proportions Compared

In order to test the closeness of the observed estimates with that of the market listings recorded on Division of Fish and Game receipts, a comparison was made between the observed estimate of *S. paucispinis*, corresponding to the market-listed bocaccio; *S. goodei*, corresponding to the market-listed chili-pepper; and *S. flavidus* and *S. serranoides*, corresponding to the market-listed yellowtail rock cod. Not only are these groups quite well defined in the markets but they represent approximately 80 per cent of the rockfish landed at Monterey during the one-year period under investigation.

In table 3 and figures 83 and 84 are shown the observed estimates compared to the market listings for the three main groups given above, during the period April, 1937-March, 1938. For the year the observed total for bocaccio is lower than that of the market listings, while the observed estimates for chili-pepper and yellowtail rock cod are higher. The combined observed estimate for the year, for the above three groups, is 84.9 per cent while the market listings showed 79.1 per cent.

TABLE 3.

COMPARISON BETWEEN MARKET-LISTED AND THE OBSERVED PROPORTIONS OF THE MOST IMPORTANT ROCKFISH AT THE PORT OF MONTEREY,
BY MONTHS AND FOR THE ONE-YEAR PERIOD, APRIL, 1937-MARCH, 1938, BASED ON THE TOTAL LANDINGS OF ROCKFISH

BOCACCIO = *S. paucispinis*

	January	February	March	April	May	June	July	August	September	October	November	December	Year
Listed.....	68.6%	40.9%	9.2%	30.3%	60.3%	74.6%	75.2%	65.4%	48.7%	70.0%	72.4%	52.6%	53.1%
Observed.....	38.9	19.9	20.1	31.8	67.7	68.3	48.0	62.6	36.2	66.1	52.0	34.1	39.4

CHILI-PEPPER = *S. goodii*

	January	February	March	April	May	June	July	August	September	October	November	December	Year
Listed.....	2.3%	28.4%	81.2%	59.2%	23.2%	4.5%	.3%	15.0%	38.9%	10.0%	6.8%	16.3%	26.0%
Observed.....	13.3	35.3	69.5	60.8	20.0	3.8	-----	15.6	53.6	5.9	6.9	14.9	30.8

YELLOWTAIL ROCK COD = *S. flavidus* and *S. serranoides*

	January	February	March	April	May	June	July	August	September	October	November	December	Year
Listed.....	7.1%	12.5%	5.2%	2.1%	2.6%	2.5%	7.6%	8.3%	2.4%	3.3%	4.9%	7.7%	5.8%
Observed.....	10.5	12.8	5.2	.7	2.2	8.6	19.0	15.2	4.3	11.1	15.4	14.7	8.9

ALL OTHER ROCKFISH

	January	February	March	April	May	June	July	August	September	October	November	December	Year
Listed.....	22.1%	18.2%	4.4%	8.3%	13.8%	18.4%	16.0%	10.4%	10.0%	16.7%	15.0%	23.3%	15.1%
Observed.....	37.3	31.9	5.1	6.8	9.4	19.4	32.0	6.6	5.8	16.9	25.7	36.3	20.8

On the whole, the comparison of observed estimates with the market listings shows that the market listings do bring out the three most important species or groups of rockfish at Monterey in their proper order along with their seasonal trends.

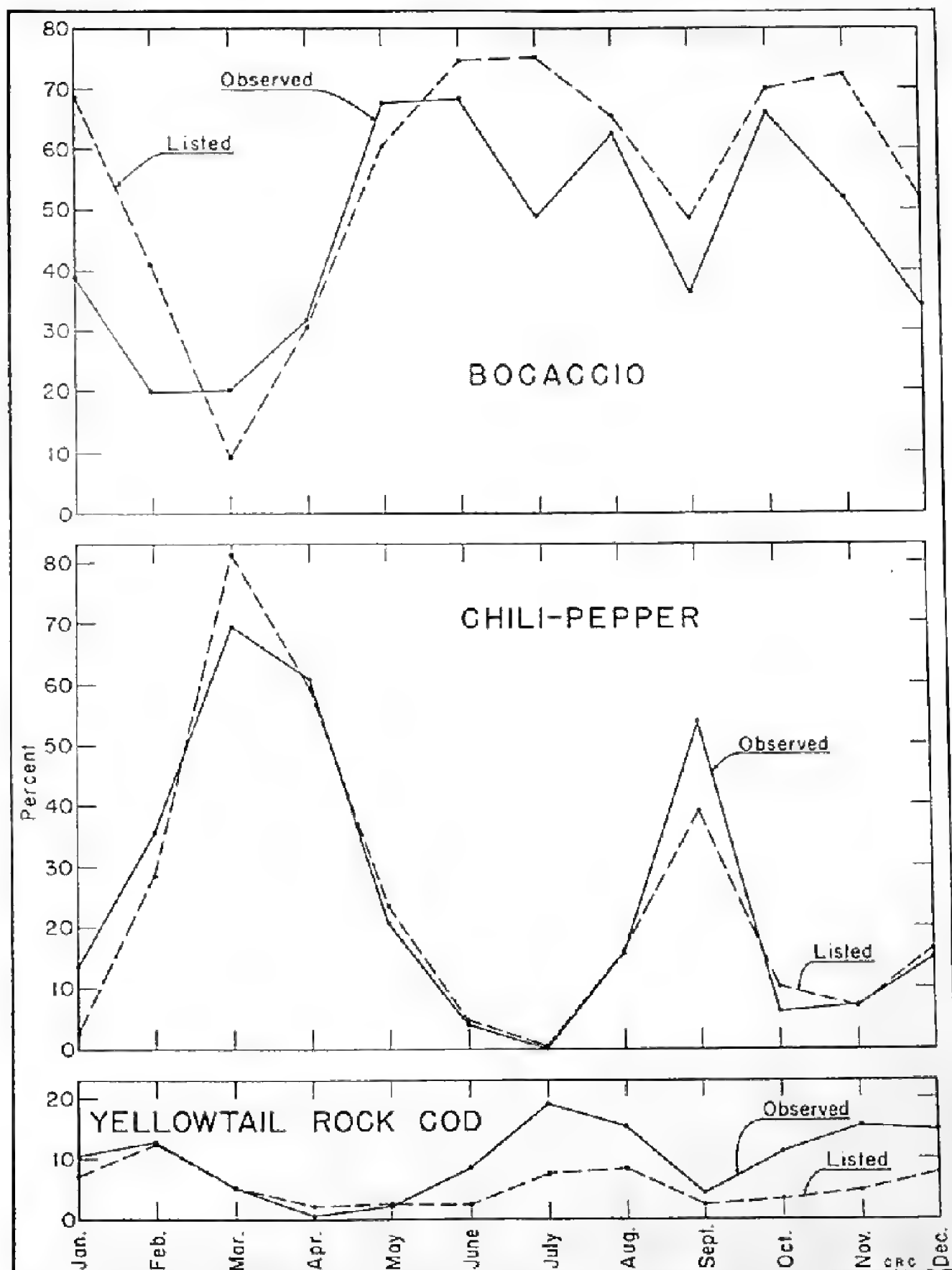


FIG. 83. Monthly comparison between the market-listed and the observed proportions of the three most important rockfish at the port of Monterey, during the period April, 1937-March, 1938, based on the total landings of rockfish.

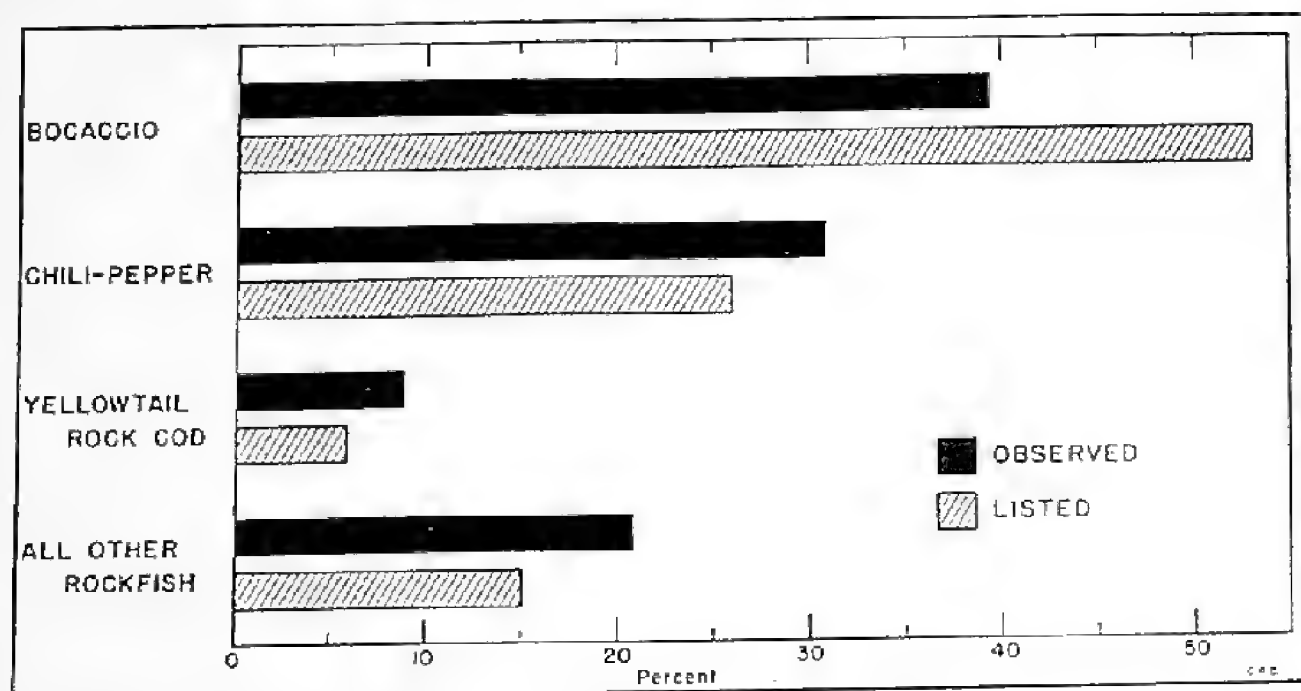


FIG. 84. Comparison between market-listed and the observed proportions of the most important rockfish at the port of Monterey, for the one-year period April, 1937-March, 1938, based on total landings of rockfish. Actual proportions are probably somewhere between the market-listed and observed figures.

Definitions of Fishermen's Names

Definitions of names used by Monterey fishermen for the different rock cods appearing in table 1, have been compiled in the list that follows. Inasmuch as the fishery was developed primarily by Portuguese and Italians, most of the names are in these tongues. The Spaniards also come in for their share of names but since Spanish, Portuguese and Italian are Latin-root languages, a name may have the same meaning in more than one of these tongues. No attempt has been made to obtain Slavonian or Scandinavian names as these nationalities are in the minority. A number of the rock cods have too many names, as it is. The Chinese who preceded the Portuguese and Italians, fished rock cod as well as squid and abalones, but they apparently made no attempt to separate the various rock cods. Many of the names are directly or indirectly descriptive of the fish or some particular feature, but a few names may refer to a town in the old country, or to a particular locality in central California where a form was recognized for the first time. In the instances where the name is synonymous with that of a town in the old country, either the fish resembles a form that was taken near that town, or the town of a fisherman who first became curious of the then unusual fish was honored by other fishermen. Not all the species have names, as they may appear infrequently or outstanding characteristics may be lacking. Further research may also produce more names than have been collected in this list:

<i>Fishermen's Name</i>	<i>P—Portuguese S—Spanish I—Italian</i>	<i>Reference to:</i>
Barriga Blanca -----	(S)	White belly.
Barriga Branca -----	(P)	White belly.
Becafigo -----	(S)	A bird in the old country.
Beccafico -----	(I)	A bird in the old country.
Boccaccio -----	(I)	Large ugly mouth.
Bolina -----	----	Apparently refers to Bolinas Bay, where in central California, the species was first taken in numbers.

<i>Fishermen's Name</i>	<i>P—Portuguese S—Spanish I—Italian</i>	<i>Reference to:</i>
Borracho -----	(S) (P)	Drunkenness (as red as this).
Borrachon -----	(S)	Great drunkard (as red as this).
Cefalutano -----	(I)	Inhabitant of Cefalu, Italy.
Chefra -----	(I)	What among? (other fish)
Cherne -----	(P)	A Portuguese fish.
Chili-pepper -----	----	General red color.
Chinafish -----	----	Preferred by many Chinese.
Codularga -----	(I) (S)	Large or wide tail.
Convict fish -----	----	Barred sides.
Cowfish -----	----	Large size of specimens.
Dude -----	----	Colorful.
Fagiano -----	(I)	Pheasant.
Pillone -----	(P)	Apparently a colloquial reference by Portuguese, to the Farallone Islands, near where the form was first taken in numbers.
Gallo -----	(I) (P) (S)	Rooster. (Referring to deeply incised spiny dorsal fin membrane, akin to the comb of a rooster)
Garrupa -----	(P)	Grouper. (Colloquial reference to)
Gopher -----	----	Habit of sticking tight to rocks or holes in rocks, analagous to a gopher on land.
Nero -----	(I)	Black.
Occhio-grande -----	(I)	Large eyes.
Palermotana -----	(I)	Inhabitant of Palermo, Italy.
Racha (Rasher) -----	(P)	Cleft in rocks, where form is caught.
Rafaha -----	(P)	Queen.
Reina -----	(I) (S)	Queen.
Roosterfish -----	----	Referring to deeply incised spiny dorsal fin membrane, akin to the comb of a rooster.
Rossa -----	(I)	Red.
Scacciatale -----	(I)	Similar to being driven away, that is, difficult to find.
Scomoda -----	(I) (S)	Inconvenient; tiresome (hard to catch).
Serena -----	(I) (S)	Serene appearance.
Shellies -----	----	Showiness.
Spanish Flag -----	----	Bars on sides resemble colors of this flag.
Steamer Rock Cod -----	----	First taken in quantity by drag boats working in steamer lane south of San Francisco.
Strawberry Rock Cod -----	----	Green and reddish color.
Tambor (Tambora) -----	(P) (S)	Drum. (Released pressure causes the belly to become extended akin to a drum. In many rockfishes brought up from great depths, the distended air bladder and even the stomach, in an inverted condition, may project into the mouth)
Vecchia -----	(I)	Old woman.
Viuva -----	(P)	Widow.
Widow -----	----	Black peritoneum and small effeminate mouth give impression of lonesomeness to occasional specimens that appear among the more common bocaccio, chili-pepper and yellowtail rock cods.
Yellowtail Rock Cod -----	----	Color of tail.
Zipola -----	(I)	Small mouth, like a spigot or peg.

AN UNAPPRECIATED CALIFORNIA GAME FISH, THE ROCKY MOUNTAIN WHITEFISH, *PROSOPIUM WILLIAMSONI* (GIRARD)¹

By WILLIAM A. DILL and LEO SHAPOVALOV
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California Division of Fish and Game

During several seasons of creel census work on the Truckee River in California, the authors have been made aware of the scanty knowledge possessed by anglers of the Rocky Mountain Whitefish. At well-fished "holes" it is not uncommon to see many whitefish strewn on the banks to rot. Many anglers throw away their entire catch of this species—believing it to be worthless. Several reasons may be assigned for this:

(1) A close relative of the salmon and trouts, the whitefish differs from them in possessing larger scales, weaker teeth, and a smaller mouth. The snout of the male whitefish, particularly during the spawning season, is somewhat produced. These characters plus its absence of bright colors give it a somewhat superficial resemblance to a sucker (family Catostomidae). Hence, anglers mistake it for one, and since, "No one would eat a sucker"—it is discarded. Ironically enough, a true sucker of the Truckee river which develops a "rainbow" on its sides during breeding season is often mistaken for a trout by some of these same anglers!

(2) In California the term "whitefish" is rather indiscriminately applied to several of the larger minnows (family Cyprinidae). This term is used particularly for *Ptychocheilus grandis* (Ayres), the Sacramento Squawfish, also known as Sacramento pike, pike, hardhead, hardmouth, etc. *Ptychocheilus* is considered inedible by most fishermen, who complain of its many bones. Because of the similarity of common names and the fact that *Prosopium* is reputed (although unwarrantedly) to be too bony (even by those who have never eaten one), it is possible that it is also confused with this minnow.

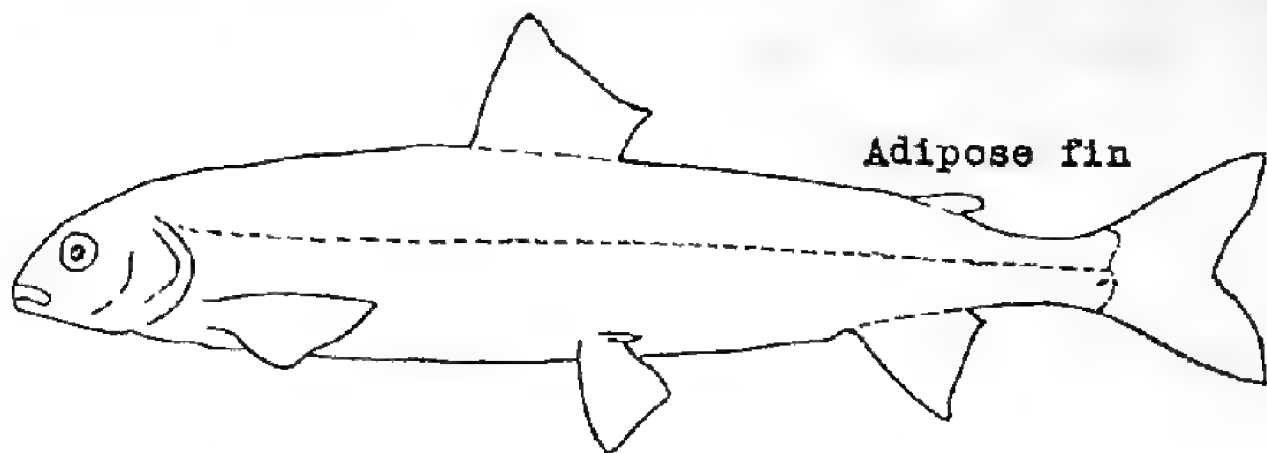
(3) Although the whitefish is classed in the California Fish and Game Code as a game fish, there is no limit to the catch. It is a very human characteristic that unless a "price" or restriction is set upon something it is apt to be considered valueless.

While our whitefish may not be as gamy as a trout, still it rises to a fly and puts up a very creditable battle. Furthermore, it is an excellent table fish—its flavor comparing well with that of any other salmonid.

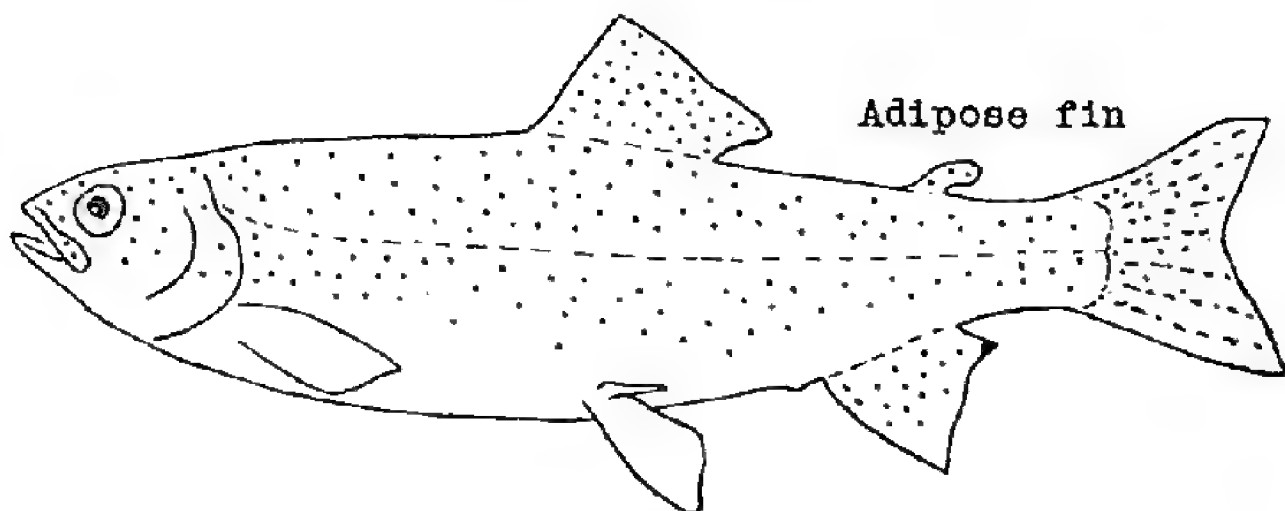
Since its distribution in this State is limited to a few streams and lakes on the eastern slope of the Sierra Nevada (Truckee River, Trout Creek, Fallen Leaf Creek, Lake Tahoe, Donner Lake, Lower and Upper Twin Lakes, Walker River, Carson River), and since its increase is

¹ Submitted for publication, March, 1939.

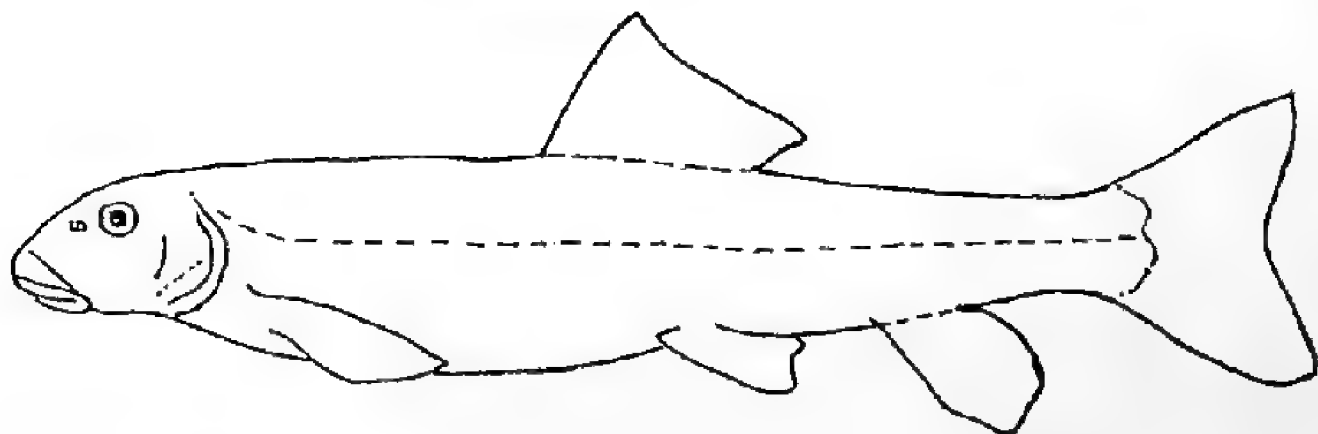
dependent entirely upon natural propagation, it is hoped that this waste will not continue. The presence of an adipose fin will easily distinguish whitefish from either suckers or minnows. (See Fig. 85.)



ROCKY MOUNTAIN WHITEFISH



TROUT



SUCKER

FIG. 85. These drawings illustrate the differences in appearance between whitefish, trout and sucker. Of all the fish found in the mountain streams and lakes of California, only the trout, salmon, catfish and Rocky Mountain whitefish have adipose fins. The sucker is the only fish in those waters with the mouth situated beneath the head.

THE OPAH (*LAMPRIS REGIUS*) AND ITS OCCURRENCE OFF THE CALIFORNIA COAST¹

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The giant opah or moonfish (*Lampris regius*),² although widely distributed throughout the open waters of the Atlantic and Pacific oceans, is in most regions uncommon, with records of capture appearing sporadically. The opah is occasionally encountered in California waters; several specimens have made their appearance recently to call our attention to this remarkable fish.

Individuals of this usually slow-swimming species are at times seen near the surface. They are said to attain a weight of 500 to 600 pounds and a length of six feet. Of interest to the zoologist because the species is the only living representative of a group of fishes which were formerly more abundant, it is also of interest to the layman because of its spectacular coloration. The upper parts are reddish purple which grades into reddish below. Lips, snout and fins are extremely bright vermilion. The sides of the body, cheeks and opercles are spotted with oval or round silvery spots which shine through the scales. With the scales removed, the body is a dark silvery grey, with the spots now very distinct. The tongue is white, tinged with vermilion. It is difficult to describe satisfactorily the brilliance of these colors, for one must see the fish alive in order to appreciate it. One ichthyologist has remarked that the opah shows the brightest red of any fish he has ever seen.

There are reports that *Lampris* is not a rarity in certain localities. Fulton (1902) lists the number of this species landed at Aberdeen market during the preceding year: June, 3 specimens; July, 10; August, 1; September, 2; a total of 16 specimens, all taken by line fishing and during four summer months. It is interesting to note that no fish were taken during the rest of the year. This periodicity of occurrence is not borne out by the Pacific Coast records of capture.

The first published note on the opah is found in Sibbald (1684), in which he gives a poor illustration and mentions that it is an undescribed fish which is ornamented with golden spots and reaches a length of 42 inches. Mortimer (1750) published a description of *Opah guiniensium* (= *Lampris regius*) from a specimen taken at Leith and later exhibited before the members of the Royal Society. To his account of this species, Mortimer added that "the Prince of Anamaboo,

¹ Submitted for publication, April, 1939.

² Three separate specific descriptions of the opah bear the publication date of 1788: *regius* of Bonnaterre, *guttatus* of Brünich and *luna* of Gmelin. Although *luna* is still commonly used, the following opinion is given by Jordan, Evermann and Clark (1930): "The name *regius* certainly has priority over *luna* and probably over *guttatus* also."

a country on the west coast of Africa, being then in England, recognized the fish immediately as a species common on that coast, which the natives called opah, and said that it was good to eat." Hence, the name opah.

Since that time, little has been learned concerning the biology of this species. Although ordinarily supposed to be a surface fish, suggested by its sunfish-like habit of lolling at the surface and showing the dorsal fin, this supposition is not borne out by the observations of Lowe (1843). He states that they are sometimes taken near Madeira, but only during early tunny season and at a depth of 50 to 100 fathoms, the fishing being done at a short distance offshore, with the use of a local horse mackerel as whole bait. The Honolulu "Star Bulletin," in an early issue of 1922, reported the capture of an opah taken 13 miles west of Oahu, and at a depth of 200 fathoms. Contrasted with the above depths at which specimens were taken, are the records for the Pacific Coast, in which most of the captures have been made near the surface. A notable exception to this is a specimen from Alaska which was taken on long-line halibut gear at 50 fathoms. (Bell and Kask, 1936.)

Formerly on the island of Madeira, the opah was held in such high esteem that every specimen taken was required by law to be carried to the governor of the island, without whose license it could not be sold in the market. The fact that the Madeiran fishes were taken only during early tunny season is additional evidence supporting the periodicity of occurrence previously shown by the Aberdeen landings. It is a problem as to why *Lampris* should be taken only during certain times of the year in these localities, whereas in other regions, as in California, specimens are taken at all times of the year.

It is thought that squids and octopuses form a large part of the moonfish diet. Scott (1903) found the beaks of 54 cuttlefishes in the stomach of a single opah. In the vicinity of Madeira the food is often largely composed of crustaceans, especially sea woodlice (isopods).

In a report to the Scotland Fishery Board, Fulton (1901), gives the results of his examination of the eggs from a gravid female 4.5 feet long. The two ovaries measured 290x70 mm. and 240x70 mm.; the weights were 276 and 255 grams respectively. The dark color of the gonads was thought to be due to the unusual vascularity. The lumen in the center of each ovary was surrounded by great numbers of ova, the largest of which measured 0.82 mm. in diameter. From the character of the eggs, Fulton believes that they are probably pelagic. Yet, as Gudger (1930), has pointed out the eggs are not known to have been taken, despite the large amount of plankton tow-net work which has been done in the North Atlantic and elsewhere.

Twenty-four opahs are known from California waters; however, it is possible that some of these records may be duplicates. Jordan and Evermann (1896) speak of having examined a specimen which came ashore in Monterey Bay. In the Stanford University Natural History Museum there is a pectoral girdle of a large *Lampris* from Monterey Bay; this may be the same fish. Jordan (1905) speaks of another moonfish taken off San Pedro Point (near San Francisco). Starks and Morris (1907) state that a Mrs. Andrews of San Diego has a painting of an opah which was caught in the vicinity of that town; they also

record having seen two skins at Avalon. Holder (1912) says that four or five have been caught near Santa Catalina Island. Higgins made careful measurements and counts on a specimen taken in southern California, November 22, 1918. The data have been reported by Gudger (1931). On May 12, 1924, a 46-pound specimen was brought into the San Pedro fish markets. A note by Thompson (1924) on a 50-pound opah caught about the middle of May in a mackerel net one mile off Point Fermin, undoubtedly refers to the above specimen, although Gudger (1931) has interpreted it as two different fish. An anonymous note appeared in the "California Fisheries" (April 9, 1929, p. 19) about a 97-pound *Lampris* taken off San Pedro by net fishermen. Andy Martin of Beverly Hills in a communication to Gudger (1931) lists eight opahs taken near Santa Catalina Island within the past thirty years, none of which is thought to have been previously reported. Only two of the records are definite as to date and weight: the first taken about 1900 weighed 60 pounds, and the second, taken during 1924, weighed 160 pounds. The latter is the heaviest fish taken on our coast to date. On May 24, 1936 an opah was taken at Avalon, Santa Catalina Island, weight 110 pounds. It was reported by Earl Wood, Avalon boatman, and a photograph of the fish appeared in the newspapers. Wood stated, "It has been four years since one was brought into Avalon" (communication from Richard S. Croker). A 118-pound fish was taken at one of the islands off Santa Barbara by a commercial fisherman, December 31, 1937, and was delivered to a market in Santa Barbara (notes from W. L. Scofield). On March 10, 1937, the crew of the sardine boat *Frances* put out a ring net near Anacapa Island, and upon taking it in, were greatly surprised at the spectacularly colored 120-pound opah caught with the sardines. This specimen was sent to the Stanford Museum by the California State Fisheries Laboratory at Terminal Island. Another opah was taken the following year by J. R. Jones of the salmon troller *Leola* who was trolling with a brass spoon at about three knots per hour ten miles west of Humboldt Bar when, "Suddenly a fish struck the lure with considerable fury, and fought like a large salmon until brought to gaff alongside the boat." It proved to be a bright red 13-pound opah. This specimen was forwarded to the Museum by Fish and Game Warden Leslie E. Lahr of Eureka, California, July 28, 1938.

Since no data have been reported for the last two *Lampris*, a table of counts and measurements is included (table 1). For convenience the two specimens reported by Gudger (1931) are also included. *A* refers to the 1918 Higgins specimen, *B* to the 1924 San Pedro opah, *C* to the 1937 Anacapa individual, and *D* to the Humboldt Bar specimen.

With some exceptions these fish from California fit the description as given by Jordan and Evermann (1896). Dorsal rays are 48-49 rather than 53-55. [Jordan and Evermann may have taken this count from Lowe (1843), for this is the count which he gives for a series of specimens.] Head in standard length is 2.7-3.0 rather than 3.25, and depth in standard length 1.4-1.54 rather than 1.75. In the last two specimens the dorsal and anal fins were not depressible into a groove, nor were there pits at the bases of the caudals. The low anal count of the 1924 San Pedro specimen (*B*) is undoubtedly not normal.

For the Pacific Coast there are records of five specimens in addition to the 24 from California. Bell and Kask (1936) have reported the counts and measurements on three *Lampris*: one from Cape Blanco, Oregon, October 1, 1935; another from Cape Flattery, Washington, September 9, 1935; and the last from Icy Bay, Alaska, September 21, 1935. They also report a fourth specimen from 20 miles south of Lennard Island Light, British Columbia, August 18, 1935. The weights of these specimens were 13, 10, 12 and 18 pounds, respectively.

TABLE 1.
COUNTS AND MEASUREMENTS OF *LAMPRIS REGIUS*

	A		B (46 pounds)		C (120 pounds)		D (13 pounds)	
	Inches	Per cent of stand-ard length	Inches	Per cent of stand-ard length	Inches	Per cent of stand-ard length	Inches	Per cent of stand-ard length
Total length.....	36		36½		49		23	
Standard length.....	33		29		41		19	
Depth.....	21¾	66.0	20	69.0	26½	64.5	12¾	67.0
Depth: caudal peduncle.....			2½	8.9	3	7.3	1½	7.9
Length head.....	11¼	34.0	10	34.4	14¼	34.8	7	37.0
Length snout.....			4¼	14.6	6	14.6	2½	13.0
Diameter eye.....	17⁄8	5.5	2	6.9	2½	6.1	1½	7.9
Interorbital space.....	47⁄8	14.8			6	14.6	2¾	14.5
Length maxillary.....	33⁄8	11.0	3½	12.1	5	11.9	2¼	11.8
Snout to dorsal insertion.....			15½	53.5	20½	50.0	9¾	51.3
Snout to ventral insertion.....			18½	63.8	25	61.0	12	63.0
Height, dorsal.....					6	14.6	5	26.3
Longest ray, dorsal.....	9¾	28.4	10	34.4	9	22.0	6¾	35.6
Longest ray, pectorals.....	9½	27.6	8½	29.3	12	29.2	5¾	30.2
Longest ray, ventrals.....	10½	31.8			9¾	23.8	7	36.8
Base, dorsal.....					22½	55.0	9¾	51.3
Base, anal.....					15	36.6	7¾	38.1
Base, pectorals.....					3½	8.5	1¾	9.2
Base, ventrals.....					3	7.3	1¼	6.57
Dorsal rays.....	48		49		48		48	
Anal rays.....	42		33		broken		38	
Ventral rays.....	13		15		15		15	
Pectoral rays.....	24				23		23	
Caudal rays.....	30				32		broken	
Branchiostegals.....	6				6		6	
Gill rakers.....	13-14				13		13	
Pores in lateral line.....	80?				81		81?	
Length/head.....	3.0		2.8		2.9		2.7	
Length/depth.....	1.54		1.4		1.5		1.5	
Head/snout.....			2.35		2.38		2.8	
Head/eye.....	6.3		5.0		5.7		4.65	

Vernon Brock of the Oregon Fish Commission has told me of an opah which was found struggling in the surf at Bandon, Oregon, July, 1938. The weight was approximately 120 pounds.

Gudger (1931) has contrasted the records of occurrence of *Lampris regius* for the Atlantic and Pacific coasts. He was able to find only six records for the East Coast, whereas for California alone there are 24 records, although all of them may not be authentic. Addition of the five northern specimens gives a total of 29 known from the West Coast to date. More careful reporting of records in the future may show that the opah is a much more common fish than has been suspected.

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THE TRIGGER MECHANISM OF A TRIGGER FISH (*CAPRISCUS POLYLEPIS*)¹

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During the month of May, 1939, the California State Fisheries Laboratory had the good fortune to receive from Mr. Angelo J. Musante of San Pedro, four specimens of the trigger fish, *Capriscus polylepsis* (= *Balistes polylepis*), which had been taken in the Gulf of California. These specimens were used in a study of fish vertebrae which is being carried on, and in the preparation of the skeletons for this study, the writer became much interested in the trigger mechanism from which the fish derives its name. Inasmuch as very little has been written on the operation of this mechanism, it was thought that many readers would be interested in a description of it.

The spiny dorsal or first dorsal fin of this fish (see Fig. 86) is composed of a heavy rough spine, followed closely by a shorter, light,



FIG. 86. The trigger fish, *Capriscus polylepsis*. The first two spines of the dorsal fin comprise the trigger mechanism. Photograph by D. H. Fry, Jr.

¹ Submitted for publication, June, 1939.

sharp spine, with a third short spine a little distance to the rear. Of these three spines, the first two comprise the trigger mechanism and are so arranged that the first heavy large spine can be erected and locked in position. The locking is done by the second spine. When erected and locked, a more wicked weapon of defense can hardly be imagined. Woe betide any larger fish which might perchance swallow a trigger fish. The erected spine, locked in position, would be sufficient to tear open the stomach of the luckless swallower and cause its death.

Referring to figures 87 to 89, we can see how this mechanism works. Note that in these figures the third spine is not shown, but the socket where it rests can be seen. Figure 87 shows the spines locked in the erect position. Figure 88 shows the spines unlocked, and figure 89 shows the disarticulated parts. Note the smooth wedge-shaped bearing surface at the base of the locking (shorter) spine, illustrated best in figure 89. When the fish erects and locks the large spine, the shorter

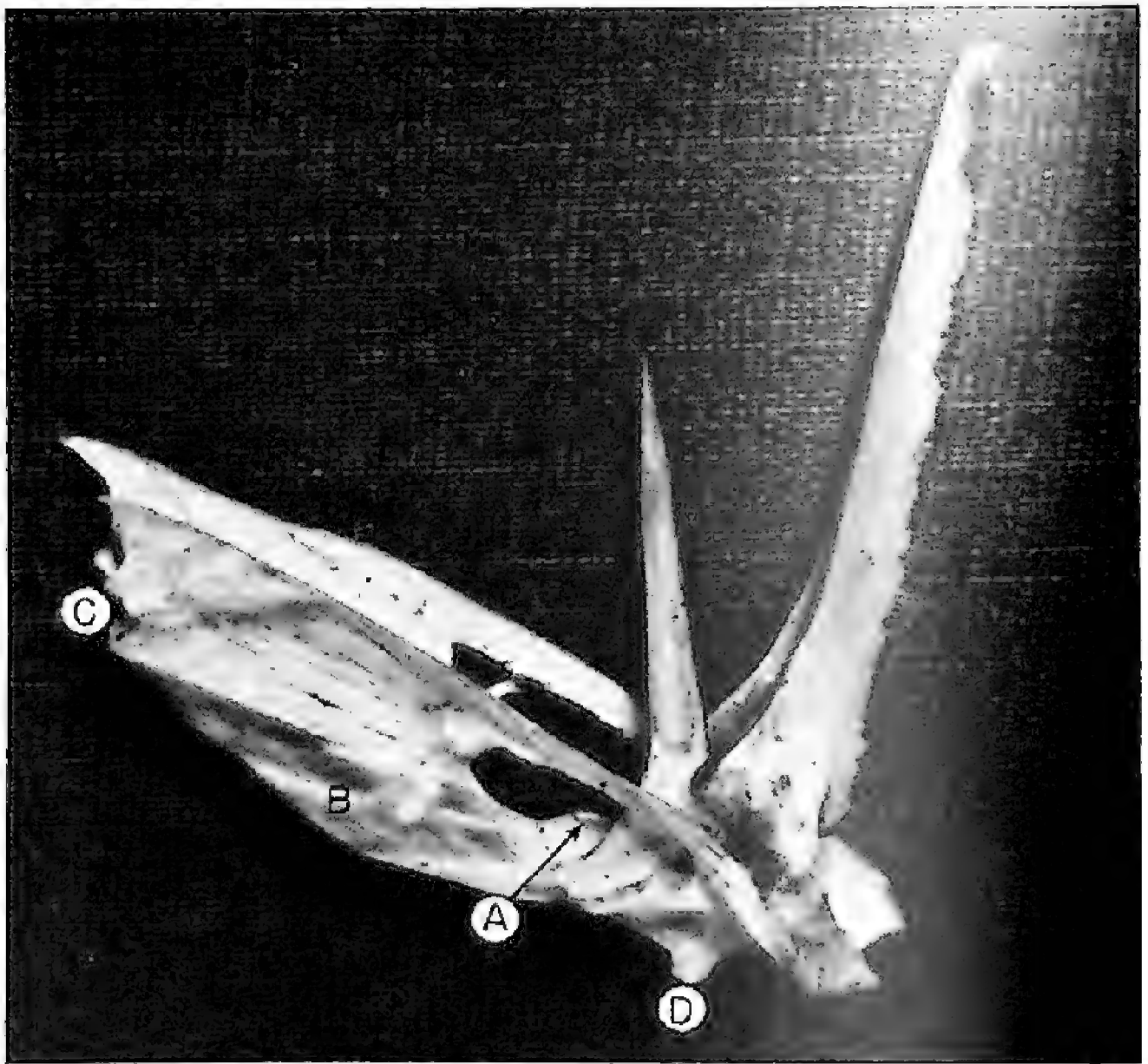


FIG. 87. Spine-locking mechanism of the trigger fish showing the spines locked in the erect position. A is the quadrant of bone supporting the load from the trigger spine. B is the bridge which transmits the load to the supporting bone pillar which connects at C. D is where the mechanism rests on the skull. Photograph by D. H. Fry, Jr.

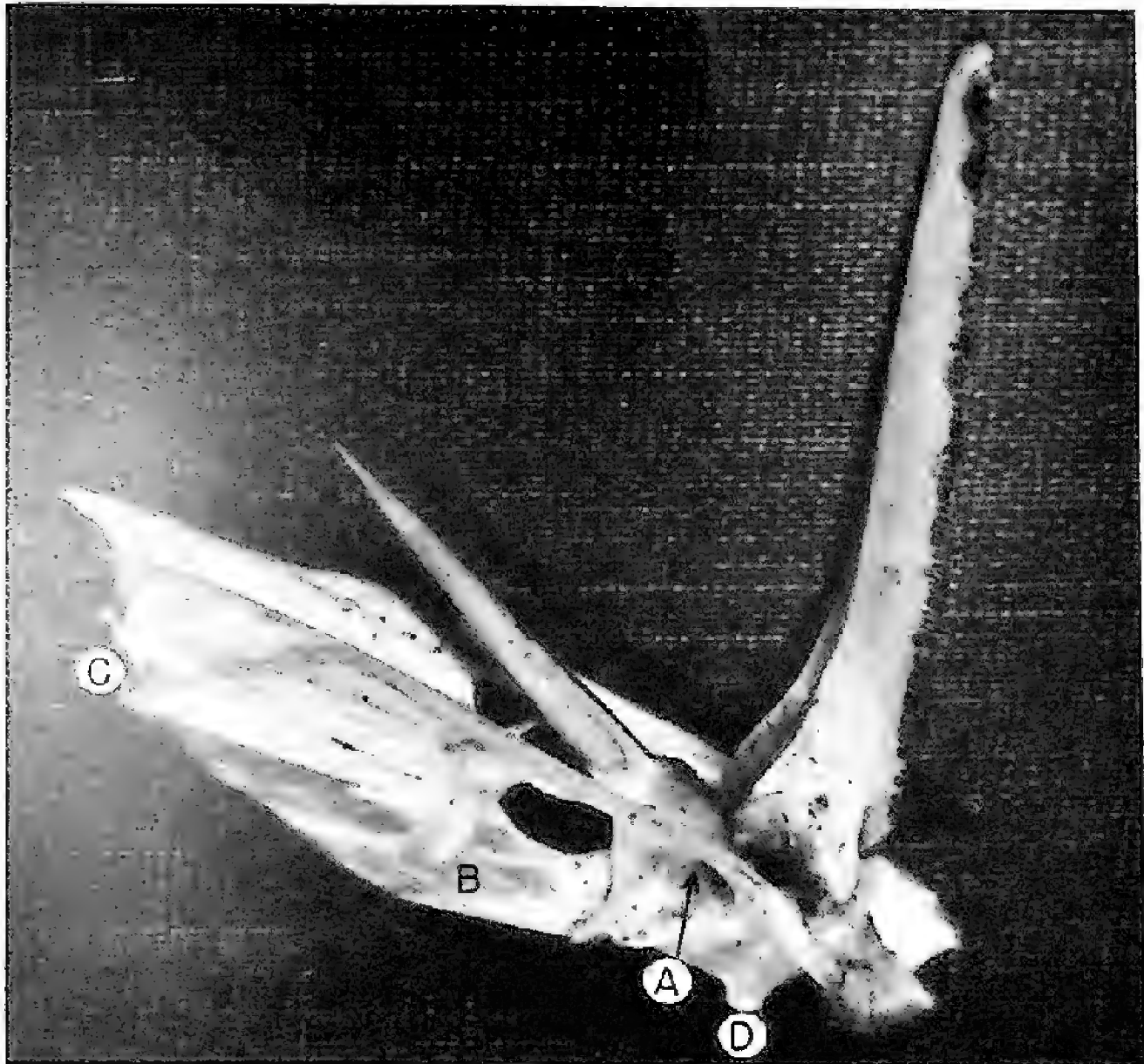


FIG. 83. Spine-locking mechanism of the trigger fish showing the spines unlocked. Note that the smaller spine (the trigger) is in a lowered position. Photograph by D. H. Fry, Jr.

spine is raised simultaneously. The wedge-shaped bearing surface on the shorter spine fits so perfectly into the groove on the under surface of the large spine that the two are most effectively jammed or locked together and any pressure on the larger spine will (if it is great enough) break the spine before the locking action gives way. And yet, a light pressure downward on the shorter spine is sufficient to unlock instantly the whole mechanism.

It is interesting to observe the engineering principles incorporated in this remarkable device, principles which would do credit to any bridge designer of the present day. Note that pressure applied to close the erected spine will be transmitted to the shorter locking spine and tend to tear it loose from the ligaments upon which it hinges at its base. To avoid this, a piece of bone in the shape of a quadrant, shown at **A** in the illustrations, is provided. This quadrant takes all the pressure and transmits it to the thin bridge shown at **B**. This is a veritable cantilever and distributes the pressure (in the form of tension throughout **B**) to the end of the mechanism where it is taken up by a small pillar of bone not shown in the pictures. This pillar connects at **C** and

extends diagonally downward to the right, the other end bearing in a socket on the fifth neural spine. The front end of the mechanism bears at **D** directly in a socket at the back of the skull. Thus we have an example, in fish life, of four engineering principles which engineers use today—a bearing quadrant, a bridge, a cantilever and a supporting post.

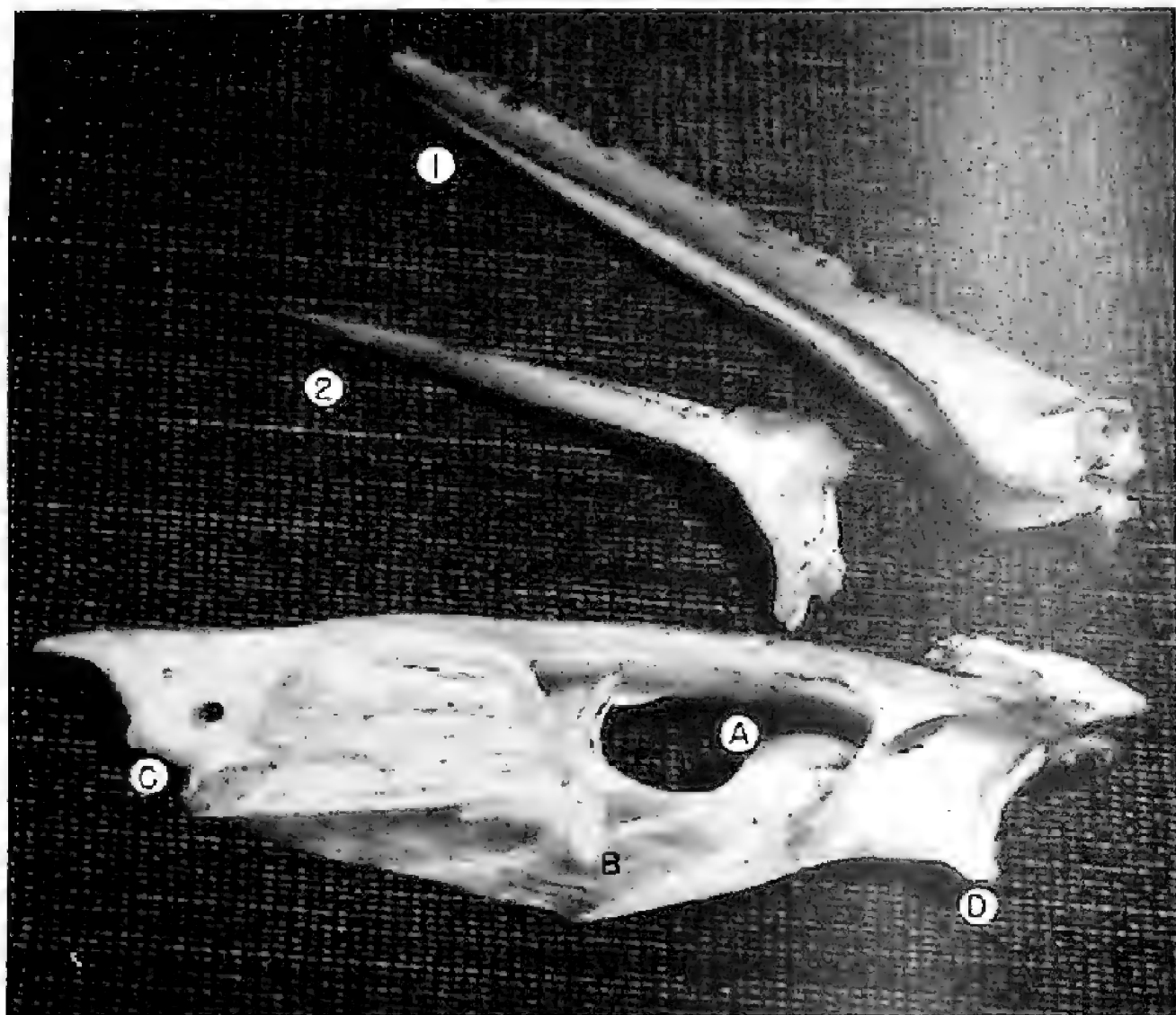


FIG. 89. The essential parts of the trigger mechanism of the trigger fish. 1 is the strong, heavy defensive spine. 2 is the trigger spine which locks and unlocks the mechanism. Photograph by D. H. Fry, Jr.

THE GRIZZLY BEAR OF CALIFORNIA¹

By E. RAYMOND HALL

Curator of Mammals

University of California Museum of Vertebrate Zoology

Bear flags snapping in the breeze from one end of the state to the other in the spirit of gay fiesta radiating from the Golden Gate International Exposition and a score of roundups, rodeos and the like, seem to have sharpened the tourist curiosity as to the ultimate fate of the most famous of all of California's bruins, the Grizzly. Daily the Museum of Vertebrate Zoology at the University of California is being asked questions regarding the history of the grizzly bear, his life and his fate. We shall now attempt to answer those questions publicly for two very good and sound reasons. In the first place, the public is entitled to this information. In the second place, the Museum of Vertebrate Zoology wants more specimens of the grizzly bear—heads, bones or other parts, in order to fill in the wide gaps in the biological history of this picturesque beast. The fact is, the grizzly disappeared from the California scene before zoologists had a fair chance to study his movements, his habits and his traits while he was actually alive. Now we must find out what we can from his remains, and these are all too scarce.

But back to those pressing questions again. I can close my eyes and see them crowding in their unvarying repetition. "When was the last grizzly bear seen in California?", "How big was the grizzly bear?", "What is the difference between a grizzly bear and a black bear?", etc.

The University is able to answer the questions more or less fully. But, we are sorry to say that we have but one complete specimen of the grizzly in our museum and incomplete specimens of only ten others. Four of these are skins unaccompanied by the skulls and others are skulls or fragments of skulls.

As to when the grizzly became extinct in California, my opinion is that the date should be set at 1925 or possibly as early as 1922. Both dates may be somewhat of a surprise to many people, for the grizzly is popularly supposed to have passed out of the picture about the time that the Argonauts used him to develop bigger and better marksmanship with their six guns and their long rifles. The basis for my opinion is as follows: C. Hart Merriam, an authority on bears, reported in the Sierra Club circular (March 12, 1925) that the parts he examined of a bear killed by Jesse B. Agnew in August, 1922, at Horse Corral Meadows, Tulare County, were unmistakably those of a grizzly. We know of none killed since then. In "Fur-Bearing Mammals of California" Joseph Grinnell, Joseph S. Dixon, and Jean M. Linsdale (University of California Press, 1937), record that: "In answer to inquiry, Mr. John R. White, Superintendent of Sequoia and General Grant

¹Submitted for publication, May, 1939.

National parks, wrote us, under date of August 3, 1928, as follows: 'I regret that we have heard nothing for the past two or three years concerning the grizzly bears that formerly roamed this district. I think there can be no doubt that a pair of these existed here seven or eight years ago, that one of them was killed by Agnew at Horse Corral Meadows, that the other subsequently frequented our meadows and was seen at the Bear Pit in Giant Forest by Foreman Small and others competent to recognize it as distinct from the California Black Bear, but that this last remaining animal has now disappeared, possibly killed or died at an unknown point in the mountains * * *. The last report of it was by cattleman Hengst on Cliff Creek, I think, three years ago.' " Thus it would appear that the last grizzly killed in California was the one shot by Agnew in August, 1922, and that another grizzly occurred in the southern portion of the Sierra Nevada until as late as 1925.

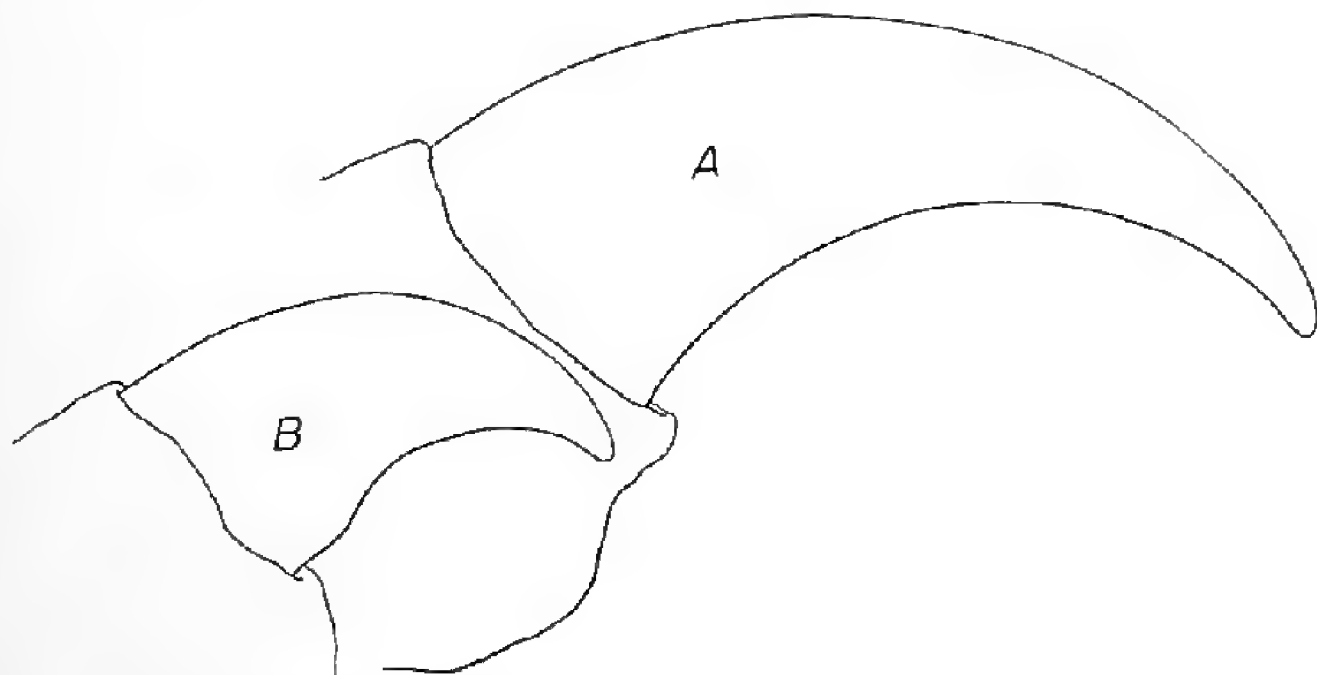


FIG. 90. Second claw on left front paw of two bears to show larger size in grizzly. A, grizzly bear (Mus. Vert. Zool., No. 27928). B, black bear (Mus. Vert. Zool., No. 27993), x 1.

The weights of some grizzly bears have been estimated at as much as 2000 pounds, but my idea is that 1200 pounds was about the maximum weight of a California grizzly. The captive, "Monarch," who finally was shot because of the infirmities of old age, in Golden Gate Park, in 1911, was admitted by all who saw him to be an exceptionally large grizzly, and he weighed 1127 pounds. He was remarkably fat when killed. His length from the tip of the nose to the tip of the tail was seven feet, four inches and his height at the shoulder, 48 inches. We know from the few skulls preserved that females were smaller than males, just as they are in most other carnivores.

Various ways have been suggested to determine whether a bear is a grizzly or instead the common black bear. The most reliable external character, I think, is the length of the front claws, which are much longer in the grizzly (see Fig. 90). Also, the skulls always may be distinguished by the large size of the last upper molar tooth in the grizzly bear (see Fig. 91, C and D).

Many people erroneously regard the cinnamon-colored bears and the black-colored bears still living in many of the forested parts of California, as two distinct species. Actually, these are merely color phases of the one species, the black bear. Cinnamon-colored and black-colored young have been found in the same litter. In California, the black bear has only these two color phases, black and cinnamon. Farther north, in the vicinity of Gribble Island, British Columbia, the cinnamon phase is absent, but along with the black phase there is a white or extremely light yellowish-colored phase, known as Kermode's bear. Still farther north, in the St. Elias Alps region of southern Alaska, there is a distinctly gray-colored phase, called the Glacier bear, found along with black-colored individuals. Only one other native wild-living North American mammal, the red fox, displays as many color phases as the black bear. The color phases of this fox are black, cross, silver and red.

The grizzly bear was not always "grizzled" or "silver-tipped"; some were blackish and others were brownish, at least in California, where there occurred also individuals that were silver-tipped. I do not know if these were color phases of the same kind of grizzly bear, or if there were different species of grizzly bears, each characteristically colored. It is to answer this and related questions that the Museum at the State University solicits the deposit there, for permanent safe-keeping, any grizzly bears or parts thereof. As is evident from the accompanying photographs of specimens now in the Museum of Vertebrate Zoology, the most fragmentary skulls are retained; even these have priceless value, scientifically. They provide information about the contour of the forehead, the length of the skull, its width across the tooth rows, and the shape and size of the teeth. It is knowledge of features of this kind which permits the naturalist to ascertain definitely the differences between species and subspecies.

In the literature on early California, "bear" meant grizzly bear. The smaller black animal was designated as "black bear." This is clearly set forth in a special article, by Joseph Grinnell, entitled "California's Grizzly Bears" in the Bulletin of the Sierra Club for the year 1938, pages 70-81. Many are the stories passed down to people now living about encounters their parents had with grizzlies. Indeed, some, but not many, persons now living have seen wild grizzly bears in California. Their incompatibility with many of man's agricultural and other pursuits would have made their presence impracticable over much of the State, although it probably would have been wise to preserve them in the wilder, more unsettled areas of California. Be that as it may, they originally were killed apparently more for the sport afforded than because of need for the hides or meat. It was, for example, a matter of pride with George Nidever (*The Life and Adventures of George Nidever*, University of California Press, Berkeley, 1937) that he, in the one year 1837, shot 45 grizzlies in the neighborhood of San Luis Obispo. To judge from Nidever's account, his chief motive in killing these bears was to demonstrate his accurate marksmanship, cool headedness, and excellence otherwise as a frontiersman. For as he himself has said (p. 52), "There was no sale for bear skins, so that we never took the trouble to skin them unless for our own use or to make a present to some friend or acquaintance." There are repeated

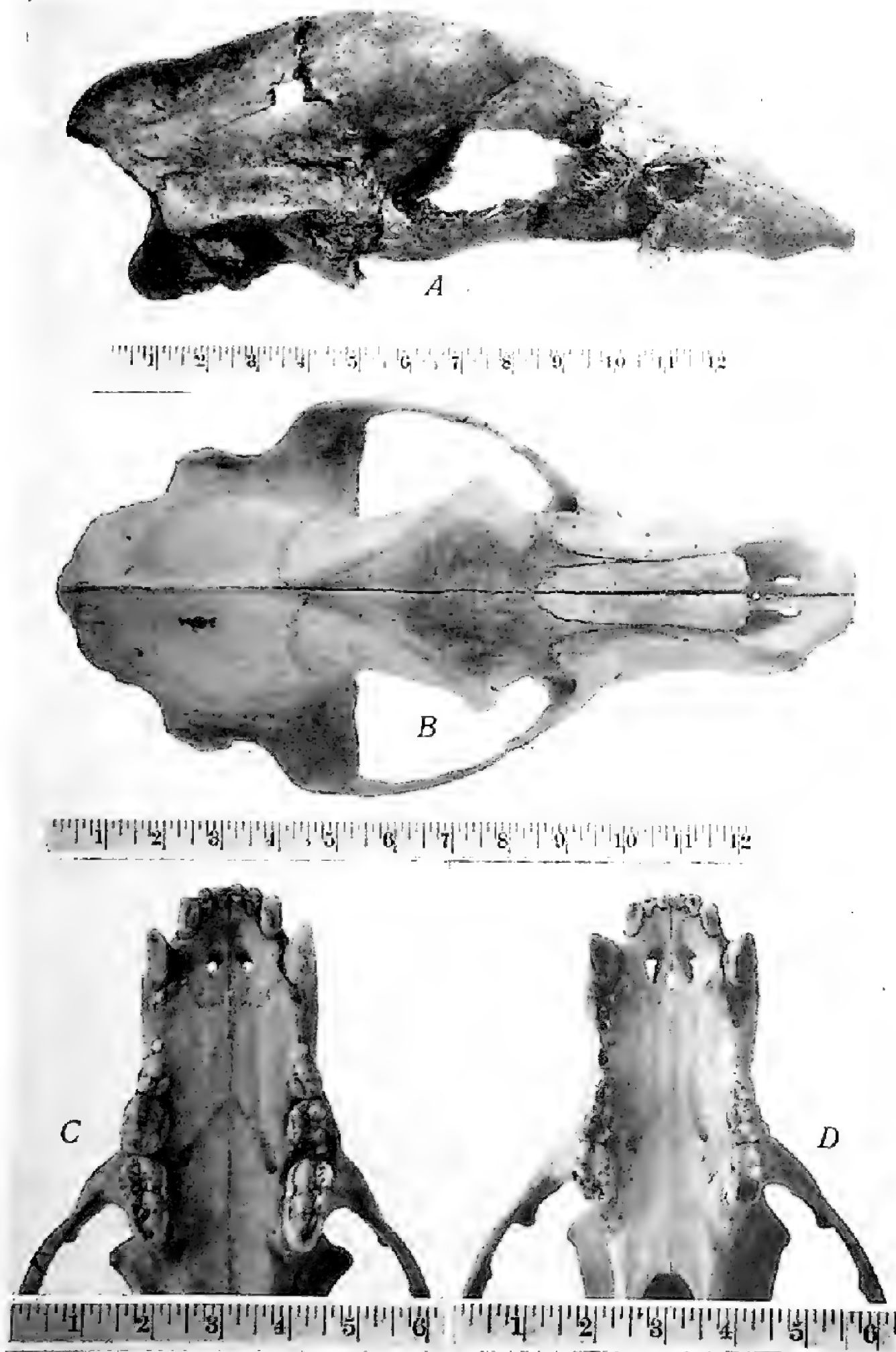


FIG. 91.

Explanation of Figure 91

A. Side view of grizzly skull (Mus. Vert. Zool., No. 28007), presented to the Museum in 1918 by L. S. Neville. Shot by Mr. Plaskett "years ago" in the mountains about five miles east of Point Gorda, Monterey County, California.

B. Top view of grizzly skull (Mus. Vert. Zool., No. 46918), presented to the Museum by Walter L. Richardson, who shot the animal, May 16, 1894, near the head of Big Tujunga Cañon, Los Angeles County, California. The skull with the skin of this bear comprises the most complete specimen of grizzly in the Museum of Vertebrate Zoology.

C. View of upper teeth of grizzly skull (Mus. Vert. Zool., No. 24408), killed October 28, 1916, by Cornelius B. Johnson, two miles northeast of Sunland, in Big Tujunga Cañon, Los Angeles County, California.

D. View of upper teeth of black bear (Mus. Vert. Zool., No. 38314), presented to the Museum by Frank C. Clarke, who killed it August 26, 1927, eight miles west of Laytonville, Mendocino County, California.

Note the large size of the last upper molar tooth of the grizzly in comparison with the small size of the corresponding tooth in the black bear. Knowledge of this difference permits one easily to recognize, among American bears, the skull of a grizzly.

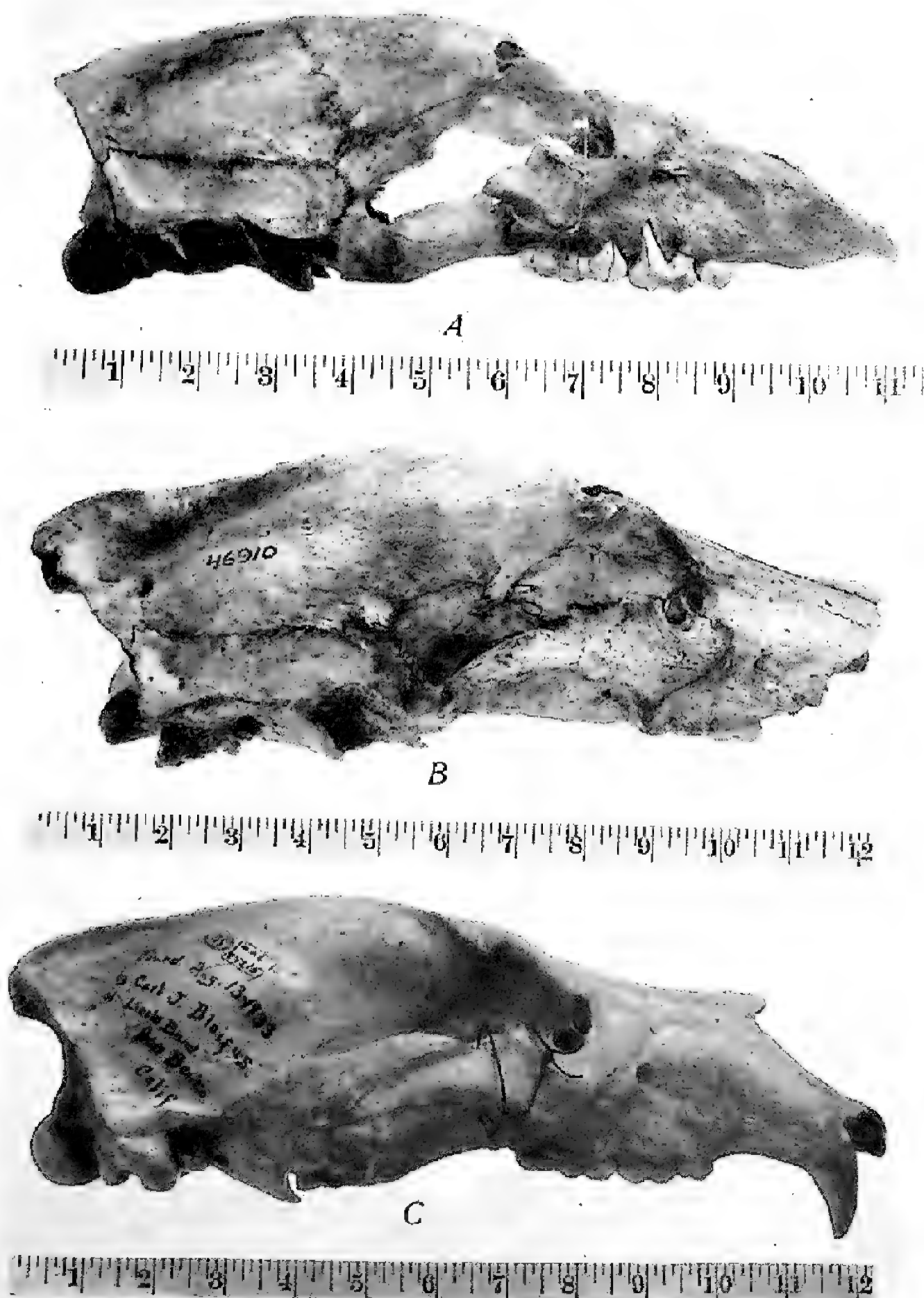


FIG. 92.

Explanation of Figure 92

A. Side view of grizzly skull (Mus. Vert. Zool., No. 35388), presented to the Museum in 1926 by Lome S. Neville. Found by V. C. De Lapp, in 1924, at the east end of Frazier Mountain, 7000 feet altitude, Santa Barbara National Forest, Ventura County, California, partly buried, when he was constructing a trail.

B. Side view of grizzly skull (Mus. Vert. Zool., No. 46910) presented to the Museum by Chase Littlejohn. Found by Sam Harvey, partly buried in ravine toward the head of San Gregorio Creek, near King Mountain, San Mateo County, California. In 1922, when Littlejohn acquired the skull, Harvey told him that it had been found "many years ago."

C. Side view of a grizzly skull (Mus. Vert. Zool., No. 84215), presented to the Museum by Carl J. Bleifus and found by him on August 13, 1933, twenty yards east of Little Bend, San Benito County, California. More of the history of this specimen is given in the text.

accounts of the Spanish vaqueros capturing bears with lassos and later pitting them against bulls in strong stockades. As stated before, it was to provide sport and amusement, that the greater number of the grizzly bears were killed in California.

The specimen last received (September 30, 1938) at the Museum of Vertebrate Zoology (see Fig. 92, C) was deposited by Carl J. Bleifus, of Hollister, California, for permanent safe-keeping in the temperature-regulated, dust-proof, light-proof vault where scientifically precious specimens are safeguarded. He supplied the following information concerning it: "Found on Sunday, August 13, 1933, * * * buried in a small slide in a narrow canyon about 20 yards east of Bluejay Splash, or Little Bend, San Benito County, California, about 2 miles south of the Lew Smith ranch. Several loose incisors (front teeth) were found and replaced in the skull. No other bones were in evidence * * * the last grizzly seen in this locality (according to Mr. Lew Smith) was about the year 1875. [Then a] bear had been bothering stock. A carcass was poisoned by the father of Lew Smith. Signs showed that a bear had taken the bait. It was never seen or heard of after." Bleifus does not say that the skull he recovered was from the animal poisoned by Lew Smith's father. He merely gives the facts and we also can only speculate if the skull shown in figure 92 C is that of the bear which was poisoned because it had been bothering live stock.

The legends for the several figures of the other skulls tell about all that is now known of the circumstances and history of each.

The original of the "Golden Bear" of California, which N. S. McLaren and H. P. Williams have named as guardian of our colors in the popular University song "Big C," and the original for the design on the bear flag which floated over California just before it joined the United States, was the California grizzly, now extinct.

Skins of grizzlies probably remain in the possession of some of the descendants of early Californians. Weathered skulls of these bears almost certainly are picked up from time to time and discarded, despite their scientific value. I have often thought that on the walls of some old barns and outbuildings of California ranches, there still must be hanging the skulls of grizzlies killed nearby. These skulls have a high scientific value, even if little or no monetary worth, and those in charge of the Museum will appreciate receipt of material even faintly suspected of belonging to the grizzly species, and are prepared to report back the true identity of the specimens. Deposited there, with the special provisions available for safeguarding them, these fragments will have maximum value, and it is only by their availability that we shall ever know more about the California grizzly which vanished before naturalists had opportunity themselves to save specimens.

A WINTER INFLUX OF SEA LIONS FROM LOWER CALIFORNIA¹

By DONALD H. FRY, JR.

*California State Fisheries Laboratory
Division of Fish and Game*

Sea lions are actually of very minor importance, but they are nevertheless a major source of friction between fishermen who insist that the creatures should be exterminated, and groups of nature lovers who object violently every time anyone shoots or suggests shooting them.

In general the fishermen insist that the numbers of sea lions are tremendous and increasing while other groups insist that exactly the contrary is true. To the Division of Fish and Game falls the task of trying to help settle such arguments, and to determine the facts of the case this organization has made five counts on rookeries throughout the State (in the years 1927, 1928, 1930, 1936 and 1938).² All of these counts were made during the breeding season because it is only at that time that the sea lions are sufficiently concentrated and sufficiently stationary to make possible a reasonably accurate census. During the rest of the year a count would be much more laborious, much less accurate, and would miss an undeterminable proportion of the sea lions.

During the breeding season (early summer) sea lions concentrate on the rookeries where it is comparatively easy to make a fairly accurate count. This is true of both species found in California—the northerly Stellers (*Eumetopias stelleri*) and the Californias (*Zalophus californianus*), which occur to the south. Occasionally, a rookery is abandoned or a new one formed, but not often enough to greatly increase the difficulties of the census-taker. During the rest of the year the sea lions move around a great deal and are apt to be found almost anywhere. Another difficulty of making a count between breeding seasons is that at times many sea lions spend the day in the water instead of hauling out on the rocks, consequently it is difficult to count them.

In spite of the difficulties involved, the Division of Fish and Game has felt for some time that it would be advisable to make a count between breeding seasons. This was because we suspected that at times there is a decided influx of sea lions from Lower California. If such an influx were great enough even an incomplete winter count would demonstrate the movement.

In early March, 1939, some fishermen came to us and insisted that

¹ Submitted for publication, June, 1939.

² Bonnot, Paul

1928. Report on the seals and sea lions of California. California. Division of fish and game. Fish bulletin, No. 14, 61 pp.

1931. The California sea lion census for 1930. California fish and game, vol. 17, pp. 150-155.

1937. California sea lion census for 1936. *Ibid.*, vol. 23, pp. 108-112.

Bonnot, Paul; Clark, G. H.; and Hatton, S. Ross.

1938. California sea lion census for 1938. *Ibid.*, vol. 24, pp. 415-419.

there were many thousands of seals on Santa Barbara Island. Even when we applied a large "factor of exaggeration" to these figures, it seemed quite possible that there were far more on the island than our summer figures ever show.

Fortunately the patrol and research boat *Bluefin* was available so we set sail March 13, 1939, to make a count from Santa Barbara Island north. The patrol boat *Yellowtail* was scheduled to be in the vicinity of Catalina and San Clemente islands at the same time and we arranged to have the crew make a count of what they saw in the course of their regular work.

The *Bluefin* visited Santa Barbara, Anacapa and Santa Cruz islands. Fog and rough weather prevented our going farther during that week, but on the following week the *Bluefin* was scheduled to go to San Francisco and her trip was arranged to allow extra time to count sea lions on the way. The writer and Phil M. Roedel (both of the California State Fisheries Laboratory) made the first trip, and Roedel made the second. In both cases, Captain Walter Engelke of the *Bluefin* was the man who really made the census possible. Captain Engelke has helped in the making of most of the counts and really knows sea lions.

We first visited Santa Barbara Island and quickly counted the sea lions on the lee side. It was entirely too rough to approach the windward side in a boat, so we went ashore and made a circuit of the island along the top of the sea cliffs. The island has many small rocky coves at the base of the cliffs and in each one we investigated there were anything up to 150 sea lions dozing or basking on the rocks. Then we came to another cove, worked our way up to the edge of a treacherous looking cliff and looked down on a beach which contained 600 sea lions, and on the next beach 350 animals were counted. (See Fig. 93.)

This shore count did not quite complete our circuit of the island, since there was one short section which could not be seen from the cliff tops. The count of the island was completed from a skiff the next day and brought the island total up to 1900—nearly four times the rookery total for this island and *almost as great as the entire State's summer population of California sea lions*. All the sea lions on Santa Barbara Island were Californias.

We found many recently fired cartridges from a .22 special, but that did not surprise us because we knew that one fisherman had been boasting about what he and some friends did to the sea lions on a quick raid on Santa Barbara Island. This was flagrant law violation not only because the sea lions are protected but because Santa Barbara Island is a national monument. However, the thing which in the writer's estimation was far worse than either law violation or wanton killing and wasting was the use of a cartridge so light that it was bound to wound large numbers and leave them to die a lingering death.

After finishing the count on Santa Barbara Island we crossed to Anacapa and found 310 sea lions (all Californias) where the previous rookery count was 10. We nearly overlooked part of these animals. The helmsman just got a glimpse of about a dozen far back in a cave on the north side of the island. He swung the boat around so we could get a better look, whereupon there was a most unholy din as about 65 yelping sea lions poured out of the cave in a panic.

From Anacapa we proceeded to Santa Cruz Island. Here we met the first Steller sea lions seen on the trip. These creatures were sharing the hauling grounds with the smaller darker Californias. The population of the entire island was: Californias, 400; Stellers, 295. From there it was necessary to return to port so that the *Bluefin* could be prepared for the trip to San Francisco.

According to Roedel the trip north was without incident. They first proceeded to Anacapa Island and re-counted the sea lions on the south side of the island. As on the previous trip most of the animals were concentrated in one large herd, but this group which had contained 220 animals on March 16 had shrunk to 50 by March 21. The



FIG. 93. Piles of sleeping sea lions, Santa Barbara Island, March 14, 1939. Photo by author.

boat then crossed the narrow channel to Santa Cruz Island and the men rechecked the large hauling ground at Gull Island and found no detectable change in numbers. From there on, they covered the coast from that point to San Francisco with the exception of the north side of Santa Rosa Island and the Monterey Peninsula.

The north side of Santa Rosa is such poor sea lion territory that it was not thought worth while to check it in a count as incomplete as this one. The Monterey Peninsula was passed at night and could not be checked without delaying the boat an entire day—more time than could be spared. Division of Fish and Game wardens stationed at Monterey informed us that there was no unusual concentration there at that time.



FIG. 94. Peacefully sleeping.



FIG. 95. The same herd in a panic. Possibly the many recently fired cartridges which we found on the island help to explain why a glimpse of a single human being was enough to start this stampede. Santa Barbara Island, March 14, 1939. Photo by author.

Method of Counting and Accuracy of Entire Count

The counts of the groups actually seen are probably accurate enough for any ordinary census purposes. The inaccuracy of this early spring count lies in the omission of some rookeries, in the tendency of small groups to haul out in unusual places and hence be overlooked, and in groups which stayed offshore and were not seen. There is also the possibility that animals may move from one rookery to another in such a way as to be counted twice or omitted entirely. Omission is the more likely possibility.

The counts of groups seen were made by two to four observers—usually three. If the separate counts of a herd checked closely, an average was taken and the figure rounded off, usually to the nearest ten. Usually the counts did check quite closely, but when they did not the observers re-counted the individual groups which comprised the herd until the reason for the discrepancy was found.

Conclusions

California Sea Lions

One of the largest California sea lion rookeries (Seal Harbor, San Clemente Island) was not visited, and for reasons stated in this article, it is certain that there were many other animals which were not counted. In spite of these factors the count of California sea lions was over twice as great as the census made in the summer of 1938. This seems to be clear evidence of a movement into California of sea lions from some other region—and the only place from which they could come is Lower California.

It is possible that this migration could have been caused by the activities of a dog food manufacturer who has been using sea lions from Lower California as a meat supply. The creatures may possibly have decided that their old haunts were no longer healthy, but it seems more likely that the migration is a regular annual event. This can not be determined without making more counts.

Steller Sea Lions

There were far fewer Stellers seen between San Francisco and Santa Cruz Island than were seen in the same areas during the previous summer's census, but the numbers roughly corresponded to those seen on the 1936 census.

Animals which were overlooked for reasons given in this paper doubtless account for part of the decrease from the 1938 rookery count to the 1939 mid-season count—possibly overlooked animals account for the entire difference but we are inclined to doubt it.

If California sea lions show a northward migration, it seems within reason that the Stellers would show a corresponding movement. Reports of unusual concentration of sea lions in the extreme northern part of the State would seem to bear out this theory.

None of this evidence with regard to Stellers is at all conclusive—all it does is to suggest some interesting possibilities.

Should Lower California Be Included in Future Censuses?

Keeping track of the sea lion population is greatly complicated by the presence of winter visitors. We have not only our own, but an unknown number of California sea lions from Lower California. The all too obvious solution would be to take a summer census during the breeding season along the Lower California coast. The writer frankly does not think such a census would be worth what it would cost. To check Lower California alone would keep a fully manned ocean going research boat busy for a month. Possibly a complete census every five or six years would be the best compromise.

NUMBERS OF SEA LIONS ON ROOKERIES AND HAULING GROUNDS
FOR YEARS IN WHICH A CENSUS WAS TAKEN

Rookery or hauling ground	Steller Sea Lions						California Sea Lions					
	Summer census					March 1939	Summer census					March 1939
	1927	1928	1930	1936	1938		1927	1928	1930	1936	1938	
St. George Reef.....	1,500	611	700	652	325	Not visited						Not visited
Turtle Rocks.....	200	200		100	93	Not visited						Not visited
Cape Mendocino.....	700	700	900	700	500	Not visited						Not visited
Point Arena.....	300	206	300	142		Not visited						Not visited
Point Reyes.....				45	6	Not visited				9		Not visited
Farallon Islands.....	700	540	900	500	357	Not visited	6		28	25	90	Not visited
Purisima.....	150	42		4	2							
Ano Nuevo.....	1,500	1,500	2,600	1,000	2,000	1,000				200		100
Bird Rock.....				25	53					250		
Cypress Point.....					1	Not visited					15	Not visited
Point Lobos.....		200	40	60	120	Not visited		70	160	3	1	Not visited
Cape San Martin.....		50				30				23		
Piedras Blancas.....	212	100	34	6	73	112	86	1	23	35	21	85
Lion Rock.....	86			60	243	150	21	6		20	10	250
Peecho Rock.....	135	95	300	70	3	90	7	75			3	10
Point Sal.....				75	35	20	10			150	25	30
Point Arguello.....				50	2			10		20		35
San Miguel Island.....	595	592	620	1,350	1,992	1,245	149	429	205	520	714	880
Santa Rosa Island.....	49	38	12	52	20							15
Santa Cruz Island.....	20	10	45		16	295	213	103	163	200	125	400
Anacapa Island.....							34	27	11	11	10	310
Santa Barbara Island.....							125	327	8	600	500	1,900
San Clemente Island.....	1						364	251	347	435	490	200
Catalina Island.....											15	30
Totals.....	6,148	4,884	6,360	4,900	5,841	2,942	915	1,380	945	2,501	2,020	4,275

* These figures are not complete since not all the grounds were visited.

^b A group of 220 seen here on March 16 had dwindled to 50 on March 21, but the population on nearby Gull Island (Santa Cruz Island's largest rookery) remained about the same.

^c These sea lions were all several miles from the San Clemente Island rookeries. They were carefully counted for us by the crew of another Division of Fish and Game boat which was there for other purposes. The rookeries were not visited.

EDITORIALS AND NOTES

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Number 3

THE BUREAU OF MARINE FISHERIES WAS FOUNDED TWENTY-FIVE YEARS AGO

Not long after this territory was accepted into the Union as the State of California, there was appointed a Fish Commission to look after fish in general but salmon in particular. Later, the need for the care of game in the State was recognized and the early State Board became the California Fish and Game Commission. With the development of albacore and sardine packing in addition to salmon canning, the technical problems involved in managing the growing marine fisheries were entrusted to specialists, and there was in 1914 created within the Fish and Game Commission a Department of Commercial Fisheries.

At this time the sturgeon supply of pioneer days had been all but exterminated and salmon were being exploited to the danger point through mild-curing and canning for shipment. The utilization of fish for local consumption in the markets of the State was not very great. It was the process of preserving fish by canning for transport to distant population centers that promised wholesale utilization of our marine resources, and the newly established canning plants for albacore and sardines emphasized the need for a special department "to conserve and at the same time assist these industries." Species of tuna other than albacore were being packed only experimentally and mackerel canning was not to be developed until fourteen years later. In 1914, the volume of fish delivered to packing plants seemed impressive, but now after twenty-five years of expansion the canneries of those days appear very primitive and puny compared with the highly organized packing establishments of 1939. The three sardine canneries of 1914 with a combined capacity of one hundred tons per day could be stored in the warehouse of one of our plants of today, and one of our present day fishing vessels frequently delivers more sardines in one boat load than was possible for the entire sardine fleet of 1914. The value of the case pack of the fish canneries of the State has multiplied about twenty-five times in the twenty-five intervening years since 1914.

Twenty-five years ago sport fishing on the ocean was conducted on a small scale and was unorganized except for a few clubs of big game fishermen seeking leaping tuna and swordfish. Occasionally, a boat took a small party of anglers trolling, but there was no fleet of party and charter boats such as we have today and there was no bevy of shore boats crowded with passengers plying to the anchored fishing barges off the coast. This conversion of the ocean into a recreational center for marine anglers led to the expansion of the old Department of Commercial Fisheries and its renaming in 1937 as the Bureau of Marine

Fisheries. The original Department has enlarged to keep pace with the remarkable growth of sport and commercial fishing in the State, and the duties and responsibilities of the Bureau have increased during the last twenty-five years in about the same ratio as ocean fishing has developed.

The announcement, published twenty-five years ago in the first issue of "California Fish and Game," of the newly created Department set forth the conservation goal and the general program to be followed. The objectives were tersely summarized as "to so regulate the taking of fish that the supply may not be exhausted." During the intervening years a gallant fight has been made to attain this ideal, but the general citizenry of the State has not been educated to the acute need for conservation of our resources and when appealed to for support of regulatory measures the response too often has been indifference through lack of an understanding of the need. The fact-finding program so bravely announced for the new Department has been carried out consistently during the twenty-five years with considerable development of the original ideas but with no departure from the essentials as set forth in 1914. A complete statistical system has been in operation, data as to fishing industries of the State have been collected, studies of the habits of fish have been made and the effectiveness and need for regulatory measures have been tested. The outstanding accomplishments along such lines have been the studies of depletion in order to be in a position to recognize the first signs of overfishing and to estimate the degree of over-utilization when depletion occurs. In 1914 the idea of basing administrative policy upon the results of carefully compiled field studies was not generally accepted as necessary or even possible, but the past twenty-five years have justified the more far-seeing founders of the Bureau. Most of the accomplishment of this Bureau should be credited to the basically sound policies put into effect when the Department of Commercial Fisheries was established and to the fact that these policies have been in continuous operation and carried out consistently over a long period of years instead of changing like a weather vane to adjust to whatever wind was blowing at the moment.—*W. L. Scofield, California State Fisheries Laboratory, May, 1939.*

MORE RECOVERIES FROM THE FIRST THOUSAND SARDINES TAGGED

In the January, 1938, issue of this magazine (page 69) there was an account of the experimental marking of 964 sardines as a trial to see whether the fish would live with a serially numbered metal tag inserted in the body cavity and to see whether these tags could be recovered from the fish meal of reduction plants by the use of electro-magnets. The first 964 marked sardines were released in Santa Monica Bay in southern California in the spring of 1936 with considerable doubt as to whether or not we would ever hear of them again, but we were agreeably surprised and encouraged when one of the tags was picked up a few weeks later by a magnet installed in the fish reduction plant of one of the canneries in southern California. This led us to hope that two or three more tags might be recovered the following fishing season of 1936-1937, but our expectations were more than fulfilled when 57

tags were found that season in the metal scrap gathered by the electromagnets. Twenty-eight tags were found the following season and 7 more were recovered during the 1938-1939 season so that up to March 31, 1939, a total of 93 have appeared as the result of the first trial marking in the spring of 1936. Naturally these first returns encouraged us to undertake sardine tagging on a larger scale, and since the 1936 marking, thousands of fish have been serially numbered for liberating in the ocean and the results so far have more than justified the effort and expense involved. The tagging experiments not only verified our conclusions about the migrations of sardines but the number of recoveries in proportion to the number of fish marked offers the possibility of using this method as a rough measure of the intensity of fishing from year to year.

In our first attempt at marking with internal metallic tags, the sardines used were small or medium-sized fish so that we did not expect early returns from northern points because we had learned that it was the largest sardines that made the long migrations from southern California to the northern waters of Oregon, Washington and British Columbia. We therefore assumed that tag recoveries would not be made north of San Francisco until sufficient time had elapsed for our young marked fish to grow to larger sizes. Apparently two years were sufficient for this growth; at any rate, the first tag recoveries north of San Francisco were made during the summer of 1938. One tagged fish was taken in Oregon that summer, two in Washington and two in British Columbia, in addition to two recoveries at San Francisco during the 1938-1939 season.

The 93 tags recovered up to March 31, 1939, represent 9.6 per cent of the original number of sardines marked. This return takes no account of the fact that few magnets were in operation during the first two years and even during the present year a portion of the sardine catch is delivered to plants not equipped with magnets, so that there is no chance of recovering the tags from any marked fish delivered to such plants. The number of recoveries and the percentage return for each fishing season are presented in the following table. The small return in the first season is due to the fact that the first liberations of marked fish were made only a short time before the close of the season.

Tags Recovered From the First 964 Sardines Marked

Season	No.	Percentage of total
1935-36	1	0.1
1936-37	57	5.9
1937-38	28	2.9
1938-39	7	0.7
Total to March 31, 1939	93	9.6

—W. L. Scofield, California State Fisheries Laboratory, April, 1939.

THE LOUVAR IN CALIFORNIA WATERS

A remarkable and unusual fish, which causes much speculation among the fishermen as to its identity each time it is taken in California waters, is the louvar (*Luvatus imperialis*). Reports of its occurrence in California are so few that it is of interest to record the recent capture of this straying species, whose habits are as yet a mystery to everyone.

The louvar, which is related to the mackerels, has exceptional coloring for a fish—its body is pinkish silvery and its fins are red. Other striking features are the dolphin-like head and the small mouth.

Mr. Earl J. Steckel, one of the proprietors of the fishing resort at Point Mugu, Ventura County, described a fish taken at that place on April 24, 1939, and sent us photographs. His description and photographs leave no doubt as to the identification of the fish as a louvar. One of the fishermen at the resort was standing on the beach when he was surprised to see a fish swim out of the breakers right on to the sand. He captured it and placed it in a concrete live bait tank where it soon died due to striking its head on the concrete. This specimen was a small one, weighing 13½ pounds.

Another louvar, hitherto unreported, was caught on hook and line by Mr. George Tavra of San Pedro on August 4, 1935. This fish, which weighed 46 pounds, was identified by Donald H. Fry, Jr., of the California State Fisheries Laboratory. Mr. Tavra caught the louvar in the vicinity of Santa Cruz Island, off the coast of Santa Barbara County, California.—*Richard S. Croker, California State Fisheries Laboratory, June, 1939.*

ASSISTANCE RENDERED BY WORKS PROGRESS ADMINISTRATION TO U. S. NATIONAL PARK SERVICE

The U. S. National Park Service, Region Four, San Francisco, wishes to acknowledge with appreciation the assistance of the Works Progress Administration in the preparation of the report by Joseph S. Dixon and E. Lowell Sumner, Jr., on "A Survey of Desert Bighorn in Death Valley National Monument, Summer 1938," which was published in the April, 1939, issue of this magazine. The manuscript and illustrations were prepared with the aid of funds and workers supplied by the Works Progress Administration. Preparation of the manuscript and photographs for publication was made possible by transfer of funds from the Works Progress Administration to the National Park Service to pay for the services of the workers.

REVIEWS

Field and Laboratory Technic in Wildlife Management

By Howard M. Wight, Associate Professor of Forest Zoology, University of Michigan. Ann Arbor, University of Michigan Press, 1939. 107 pp., 34 figs. \$1.50.

This manual was prepared by Mr. Wight for the use of his students in the School of Forestry and Conservation at the University of Michigan. Its purpose is "to present accurate, rapid, and concise methods of obtaining information in the field of wildlife management, with particular reference to game birds and game mammals." The author, in the opinion of the reviewer, has done just that.

The opening chapter—"The Scientific Method"—is particularly fine, and should be taken to heart by all beginners in the field of wildlife research, and some of the old timers. Too many of us embark on scientific careers without giving serious consideration to the qualifications that a scientist must possess if he, or she, is to be worthy of the name.

Following this first chapter, the author plunges the student immediately into the subject of technics, dealing successively with observations and taking notes; preparing cover maps; census methods; collecting, preparing and recording specimens; food habits research; activity of animals; life history studies; and general technic. Throughout the text there are numerous references to the literature, and at the end of each chapter there is a carefully selected reading list.

It strikes the reviewer that here is the answer to the prayer that is being offered up daily by those workers in the field of game management who have not been able to attend one of the few institutions of learning that offers a course in game management. The student who is willing to seriously apply himself will, with the aid of Mr. Wight's manual, be able to train himself thoroughly in the technics of wildlife management without the aid of an instructor.

A copy of this manual should be in the hands of every wildlife worker.

A number of copies have been purchased by the Division of Fish and Game library and are now available.—*Gordon H. True, Jr., California Division of Fish and Game.*

Deserts

By Gayle Pickwell. New York, McGraw-Hill Book Co., Inc., 1939. 174 pp., 64 full page photographs, bibliography, index. \$3.50.

This beautifully illustrated book will bring exclamations of delight from the confirmed desert addict, and for those who are unacquainted with the desert it will open up a veritable treasure chest.

Dr. Pickwell discusses the whole subject of deserts briefly, but thoroughly. His discussion of what deserts are, where deserts are, and

why they are deserts is particularly absorbing. We learn, for instance, that in addition to the deserts that are known to most of us—such as the Mohave and Colorado—there are other deserts lying all unsuspected under our very noses. The sand dunes at the edge of the great Pacific are deserts just as surely as are those of Death Valley. The tide flats of our coastal bays and sloughs are likewise unsuspected deserts, and there are still others—all deserts, and for many different reasons, but all having one factor in common “* * * where water is difficult for living things to obtain, or long periods of drought prevail, there one will find the conditions of the desert.”

The author does not attempt to include a complete list of desert plants and animals in the present work, but does give excellent accounts of the better known species, considering in some detail the various structural adaptations that enable them to exist under conditions of extreme drought.

Most readers will enjoy Dr. Pickwell's rather unusual style, although some will regard the outline form in which the material is presented as being too text-bookish.

Excellent reading if you aren't allergic to deserts.—*Gordon H. True, Jr., California Division of Fish and Game.*

Report on the International Law of Pacific Coastal Fisheries

By Joseph Walter Bingham. Stanford University Press, 1938. 75 pp. \$1.00.

Professor Bingham's report on the international law of Pacific coastal fisheries may best be summarized by his own words: “(a) That there never has been and is not today any general agreement on the extent of territorial waters, (b) that no state (*meaning national government*) ever has applied consistently a uniform limit for all purposes to the zone of its coastal sea jurisdiction, (c) that it always has been the opinion of realistic experts that if definite limits are set to marginal seas jurisdiction those limits should be different for different purposes, and (d) that there is no common or nearly common agreement on the matter of legality of control over coastal fisheries beyond a three-mile zone of marginal sea or other conceded territorial area.”

It is apparent from Professor Bingham's report that the “three-mile limit” is not and never has been unified international law, but that the “three-mile limit” has grown out of custom and practices of the stronger states to protect and advance their own interests. It is also demonstrated that the states throughout the world have changed their limit claim of sea jurisdictions as national interests became altered and that different coastal limits have been utilized for various purposes; that is, sea fisheries, defense, commercial, etc.

It is pointed out by Professor Bingham that it is reasonable and just that the limits of jurisdiction of coastal waters for fisheries might well be based on conservation purposes. It is apparent that any nation or all nations would benefit far more in the end by adopting a far-sighted policy in regard to jurisdiction over sea fisheries, with the one idea foremost, that of long-time fisheries conservation and management.

From the fisheries conservation standpoint of maximum usage without endangering the future supply of our fish resources, management of our fisheries is paramount. In many cases, perhaps most, the state

(national government) or political part thereof, in which the fishery is centered and which has the most knowledge of its proper management is in a position to determine what is "common-sense justice, peace and order, and conservation" in setting coastal jurisdiction for a particular fishery.—*G. H. Clark, California Division of Fish and Game.*

Speckled Nomads, a Tale of Trout in Two Rivers

By H. E. Towner Coston. New York, Macmillan Co., 1939. 299 pp., 32 pls. \$3.00.

This book tells the story of two brown trout and tells it in pleasing fashion. The first half of the book deals with the life of a trout in an English river; the second half with a trout in a New Zealand river. Both fish were descended from one batch of eggs, half of which were sent to the Antipodes, the remainder planted in England.

Mr. Coston has tread carefully the narrow path between fact and fancy and gives plausible life-history accounts of the two fish and the other stream inhabitants they encounter. The story is not told in the first person, and the fish are not given human thought processes and reactions. In other words the style is acceptable. The amount of information in this book is considerable, yet it is so well presented that it never becomes a burden.

The English trout survives all the hazards of a trout stream, predators and competitors of all sorts as well as anglers. The reviewer liked the easy way in which the book skipped from the story of the trout itself to the reactions of the fishermen trying to catch him, and back again. Eventually after a full life, the trout was caught by a skillful angler.

The New Zealand trout grew up in different surroundings and with different though no less dangerous hazards. He too lived his life to the full and finally succumbed to a well cast fly. The only fault to find with this part of the book was the all too frequent use of tongue-twisting Maori names, which is so universal among writers on New Zealand that it behooves us all to learn Maori and be done with it.

The illustrations are striking. They consist of photographs showing the development of trout from egg to fish, adult trout in action and many stream and streamside animals.

The book is both entertaining and informative.—*Richard S. Croker, Editor, California Fish and Game.*

REPORTS

STATEMENT OF REVENUE

For the Period July 1, 1938, to March 31, 1939, of the 90th Fiscal Year

	Detail	Subtotal	Total
Revenue for Fish and Game Preservation Fund:			
License Revenue—			
1939 Series, Angling:			
Citizen.....	\$40,904 00		
Nonresident.....	102 00		
Alien.....	3,485 00		
Duplicate.....	10 00		
Total angling.....		\$44,501 00	
Fish breeders.....		325 00	
Fish importers.....		75 00	
Fishing party boat permits.....		114 00	
Fish tags.....		1,020 52	
Game tags.....		85 40	
Game breeders.....		\$75 00	
Kelp harvesters license.....		132 50	
Market fishermen.....		1,000 00	
Total 1939 series.....			\$48,129 42
1938 Series, Angling:			
Citizen.....	\$443,175 00		
Nonresident.....	4,345 00		
Alien.....	6,310 00		
Duplicate.....	627 00		
Total angling.....		\$454,457 00	
Commercial hunting club, citizen.....		\$950 00	
Commercial hunting club operator			
Citizen.....	\$360 00		
Alien.....	25 00		
Total commercial hunting club operators.....		\$385 00	
Deer tags.....		136,366 00	
Fish breeders.....		10 00	
Fish importers.....		5 00	
Fish packers and wholesale shell fish dealers			
Citizen.....	\$975 00		
Alien.....	100 00		
Total fish packers and wholesale shell fish dealers.....		\$1,075 00	
Fishing party boat permits.....		191 00	
Fish tags.....		2,122 90	
Game tags.....		335 46	
Game breeders.....		155 00	
Hunting			
Citizen.....	\$411,787 00		
Junior.....	22,590 00		
Nonresident.....	8,220 00		
Declarant alien.....	3,010 00		
Alien.....	1,750 00		
Duplicate.....	593 00		
Total hunting.....		\$447,950 00	
Kelp licenses, "harvesters".....		20 00	
Market fishermen.....		49,400 00	
Trapping			
Citizen.....	\$1,772 00		
Alien.....	30 00		
Total trapping.....		\$1,808 00	
Total 1938 series.....			\$1,095,230 36

STATEMENT OF REVENUE

For the Period July 1, 1938, to March 31, 1939, of the 90th Fiscal Year—Continued

	Detail	Subtotal	Total
1937 Series, Angling:			
Citizen.....	\$6,313 47		
Nonresident.....	—30 00		
Alien.....	50 00		
Duplicate.....	2 50		
Total angling.....		\$6,335 97	
Deer tags.....		1,587 32	
Fish packers and wholesale shell fish dealers.....		50 00	
Hunting:			
Citizen.....	\$14,144 50		
Junior.....	976 00		
Nonresident.....	60 00		
Declarant alien.....	30 00		
Alien.....	75 00		
Duplicate.....	21 00		
Total hunting.....		\$15,306 50	
Trapping, citizen.....		16 00	
Total 1937 series.....			\$23,295 79
1936 series:			
Fish packers and wholesale shell fish dealers.....		\$20 00	
Total 1936 series.....			20 00
Total licenses.....			\$1,166,675 57
Other revenue:			
Court fines.....		\$30,702 43	
Fish packers tax.....		309,750 37	
Kelp tax revenue.....		287 34	
Lease of kelp beds.....		336 40	
Miscellaneous revenue.....		4,917 16	
Publication sales.....		305 19	
Salmon packers tax.....		15,077 42	
Sale of boat.....		4,700 00	
Warrants cancelled (Ch. 815-35).....		8 50	
Total other revenue.....			\$366,084 81
Total current year.....			\$1,532,760 38
Prior year, 89th:			
1938 series:			
Angling:			
Citizen.....	—\$1,406 00		
Nonresident.....	300 00		
Duplicate.....	—2 00		
Total angling.....		—\$1,108 00	
Deer tags.....		—50 00	
Fish tags.....		46 67	
Game breeders.....		—2 50	
Game tags.....		—16 67	
Market fishermen.....		120 00	
Total prior year 1938 series.....			—\$1,010 50
1937 series:			
Market fishermen.....		—\$100 00	
Angling:			
Citizen.....	\$1,400 00		
Duplicate.....	2 00		
Nonresident.....	—300 00		
Total angling.....		\$1,102 00	
Deer tags.....		—10 00	
Game breeders.....		2 50	
Hunting, citizen.....		—278 00	
Trapping, citizen.....		—84 00	
Total prior year 89th, 1937 series.....			\$632 50
Court fines.....			—225 00
Total prior year 1937.....			\$407 50
Grand total all years fish and game preservation fund.....			\$1,532,157 38

STATEMENT OF EXPENDITURES

For the Period July 1, 1938, to March 31, 1939, of the Ninetieth Fiscal Year

Function	Salaries and wages	Materials and supplies	Service and expense	Property and equipment	Total
Current Biennium					
Operating Expenditures, 90th Fiscal Year					
Administration:					\$1,230 00
Cashier.....	\$1,230 00				8,977 99
Executive.....	3,749 94	\$268 46	\$2,959 59		1,433 33
Exhibits.....	183 33		1,250 00		49,531 99
General office.....	5,574 00	2,495 73	40,728 22	\$734 01	2,955 00
Library.....	1,440 00	21 32	126 37	1,367 91	2,719 57
Property inspection.....	2,064 20	130 15	359 30	165 92	2,087 62
Publicity.....			2,087 62		2,125 05
Fish and game magazine.....		2,125 05			
Total Administration.....	\$14,241 47	\$5,040 74	\$47,511 10	\$2,267 87	\$69,061 18
Patrol and Law Enforcement:					\$23,729 92
Cannery inspection.....	\$20,582 79	\$670 99	\$2,466 17	\$9 97	11,650 08
Executive.....	8,909 85	624 70	2,089 45	26 02	8,686 03
General office.....	4,500 00	1,014 72	487 94	684 27	4,268 91
Junior patrol.....	2,730 00	348 22	1,005 29	185 40	262,118 59
Land patrol.....	165,923 09	30,572 15	48,262 12	17,361 23	114,340 89
Marine patrol.....	57,457 78	18,345 00	31,090 59	4,447 52	13,335 51
Pollution patrol.....	7,850 00	1,578 38	3,284 56	622 57	53 12
M. V. <i>Bluefin</i> galley.....		53 12			327 39
M. V. <i>N. B. Seaford</i> galley.....		327 39			
Total Patrol and Law Enforcement.....	\$267,953 51	\$53,428 49	\$91,680 12	\$23,336 98	\$436,405 10
Marine Fisheries:					\$6,179 51
Executive.....	\$5,715 00	\$133 95	\$330 56		4,134 33
Field supervision.....	2,475 00	232 26	721 60	\$705 47	3,094 33
Fish cannery auditing.....			3,094 33		9,554 87
General office.....	8,489 19	283 68	601 39	190 61	59,756 49
Research and statistics.....	36,822 12	4,284 77	14,622 94	4,016 06	
Total Marine Fisheries.....	\$53,501 31	\$4,014 66	\$19,370 82	\$4,942 74	\$82,729 53
Fish conservation:					\$12,367 91
Biological survey.....	\$7,000 00	\$839 82	\$1,230 94	\$2,397 15	5,639 40
Executive.....	5,220 00	129 93	289 47		6,456 21
Field supervision.....	4,140 00	745 55	1,434 97	135 69	6,027 29
Fish planting.....	1,068 24	929 48	2,422 67	1,000 90	11,437 62
Fish rescue.....	7,773 30	487 02	2,579 41	597 89	2,574 14
Fish food unallocated.....		2,536 52	37 62		5,774 12
General office.....	3,870 00	669 29	184 15	1,050 68	4,866 37
Pollution inspection.....	3,000 00	450 57	531 74	884 06	3 096 06
Statistical.....	1,760 00	108 92	1 134 44	92 70	100 55
Stream improvements.....		100 55			5,499 49
Structural maintenance.....	3,078 39	760 05	840 50	811 55	2,800 12
Alpine Hatchery.....	1,544 84	506 65	137 23	611 40	4,820 75
Basin Creek Hatchery.....	3,468 35	1,048 06	301 65	2 09	110 00
Bear Lake Egg Col. Station.....	110 00				1,863 52
Benbow Dam Exp. Station.....	1,543 66	104 11	200 41	15 34	11 00
Blackwood Hatchery.....	10 00		1 00		5,085 97
Big Creek Hatchery.....	2,790 00	1,853 51	160 39	281 77	504 93
Blue Lakes Egg Col. Station.....	380 00	116 08	8 85		356 58
Bogus Creek Egg Col. Station.....	190 00	61 08	105 50		4,060 50
Brookdale Hatchery.....	2,735 49	994 46	306 62	23 94	5,368 61
Burney Creek Hatchery.....	4,383 47	708 98	244 23	31 93	371 53
Carmen Lake Egg Col. Station.....	332 91		38 62		6,172 94
Central Valleys Hatchery.....	2,911 50	1,710 71	1,249 80	300 93	141 27
Cold Creek Hatchery.....		16 02	125 25		355 94
Cottonwood Lakes Egg Col. Station.....	230 49	23 45	102 00		2,591 97
Fall Creek Egg Col. Station.....	1,066 67	540 30	85 00		5,436 40
Fall Creek Hatchery.....	3,276 29	1,861 50	208 49	90 06	5,587 21
Feather River Hatchery.....	3,215 99	1,217 37	657 73	496 12	1,798 88
Fern Creek Hatchery.....	812 10	344 21	23 00	619 57	7,863 27
Forest Home Hatchery.....	4,940 26	1,315 85	961 42	645 74	5,202 04
Fort Seward Hatchery.....	3,367 58	1,391 21	368 90	74 35	25 00
Hot Creek Egg Col. Station.....			25 00		5,475 47
Hot Creek Hatchery.....	2,539 19	2,724 20	196 04	15 95	303 28
Hornbrook Egg Col. Station.....	169 35	29 88	101 35	2 70	2,137 48
Huntington Lake.....	1,562 59	305 11	243 03	26 75	29 20
Robert Creek Egg Col. Station.....		8 70	20 50		33 45
Junc Lake Egg Col. Station.....			33 45		

STATEMENT OF EXPENDITURES

For the Period July 1, 1938, to March 31, 1939, of the Ninetieth Fiscal Year—Continued

Function	Salaries and wages	Materials and supplies	Service and expense	Property and equipment	Total
Fish conservation—Continued:					
Kaweah Hatchery.....	\$2,983 06	\$799 57	\$686 00	\$578 13	\$5,047 75
Kings River Hatchery.....	3,166 35	803 16	296 58		4,266 09
Klamathon Egg Col. Station.....	1,203 80	272 48	593 64		2,071 92
Lake Almanor Hatchery.....	4,663 06	1,830 33	484 01	1,377 82	8,355 22
Lake Eleanor Egg Col. Station.....	100 00	22 70		101 41	224 11
Lytile Creek Hatchery.....	589 33	48 72	33 20		671 25
Little Walker Lake Egg Col. Station.....	268 40		8 65		277 05
Little River Egg Col. Station.....	495 00	48 01	10 00	2 65	555 66
Mud River Egg Col. Station.....	400 00	4 60	15 32		419 92
Madera Hatchery.....	1,879 79	885 18	207 72	32 87	3,005 56
Marlette Lake Egg Col. Station.....	665 23	14 31	23 80		703 34
Mt. Shasta Exp. Hatchery.....	1,415 00	616 22	23 55		2,054 77
Mount Shasta Hatchery.....	25,652 05	16,003 11	2,797 83	320 35	44,773 34
Mount Tallac Hatchery.....	1,363 27	1,272 00	223 98	102 33	2,961 58
Mount Whitney Hatchery.....	9,516 97	3,266 05	1,921 41	947 37	15,651 83
Mountain Home Hatchery.....	1,202 66	311 27	901 92	33 62	2,449 47
Mud Creek Egg Col. Station.....	230 00	20 22			250 22
Palmdale Reservoir Egg Col. Station.....	145 35	25 30	21 77		192 42
Prairie Creek Hatchery.....	3,897 33	1,747 67	682 55	522 11	6,849 66
Rush Creek Egg Col. Station.....	529 19		14 78		543 97
San Lorenzo Egg Col. Station.....	134 00	25 74	24 56		184 30
Shackleford Creek Egg Col. Station.....	250 00	13 98	54 00		317 98
Scott Creek Egg Col. Station.....	1,215 00	458 54	52 13		1,725 67
Shasta River Exp. Station.....	150 00		96 73		246 73
Shasta River Egg Col. Station.....	851 29	69 39	103 90		1,024 58
Snow Mountain Egg Col. Station.....	3,808 32	355 00	240 32		4,403 64
Tahoe Hatchery.....	4,685 00	1,135 58	319 52	659 40	6,799 50
Upper Truckee Egg Col. Station.....	51 61	2 12	20 00		73 73
Waddell Creek Station.....	990 00	87 22	51 63		1,128 85
Yosemite Hatchery.....	2,873 79	544 09	200 65	42 40	3,660 93
Yuba River Hatchery.....	2,527 15	450 21	220 50		3,197 86
Total Fish Conservation.....	\$158,794 06	\$55,802 95	\$26,923 04	\$14,935 72	\$256,456 37
Hydraulics:					
Engineering.....	\$4,816 12	\$651 70	\$1,598 44	\$256 82	\$7,323 08
Executive.....	3,060 00	285 19	585 43		3,930 62
Fish screens.....		667 40		17 30	684 70
General office.....	1,530 00	159 63	302 33	116 04	2,108 00
Total Hydraulics.....	\$9,406 12	\$1,763 92	\$2,486 20	\$390 16	\$14,046 40
Game Conservation:					
Elk Refuge.....	\$1,400 00	\$252 61	\$355 34	\$513 99	\$2,521 94
Executive.....	9,000 00	1,088 98	2,128 44	906 56	14,023 98
Game Bird Distribution, Los Serranos.....	3,870 00	810 89	562 01		5,342 93
Game Bird Distribution, Yountville.....	3,885 03	2,577 49	1,046 09		7,508 61
General office.....	3,007 64	60 46	504 67	1,126 29	4,699 06
Grey Lodge Refuge.....	3,280 00	692 03	191 67	32 25	4,195 95
Imperial Refuge.....	1,769 04	183 46	68 83	83 57	2,124 90
Los Banos Refuge.....	3,043 23	498 49	803 21	3,156 50	7,501 43
Los Serranos Game Farm.....	9,841 97	1,431 31	2,102 29	233 13	13,608 70
Los Serranos Boarding House.....	192 00	478 63	13 41		684 04
Predatory animal lion hunters.....	3,742 11	480 35	6,249 92	15 58	10,487 96
Predatory animal trapping.....	23,597 30	6,146 86	5,595 36	2,441 23	37,780 75
Refuge posting.....		4 41			4 41
Research.....	2,328 28	486 67	1,701 30	28 84	4,545 39
Statistics.....	1,702 90		1,283 73		2,986 63
Suisun Refuge.....	2,252 24	442 83	388 10	81 96	3,165 24
Winter feeding and salting of game.....		243 44			243 44
Yountville Game Farm.....	10,090 91	4,500 40	1,962 78	873 78	17,527 87
Yountville Boarding House.....	978 12	1,165 32	23 70		2,167 14
Total Game Conservation.....	\$34,900 77	\$21,644 98	\$25,080 94	\$9,493 68	\$141,120 37
Licenses:					
Executive.....	\$2,610 00	\$230 32	\$382 70	\$12 72	\$3,235 74
General office.....	1,086 43	132 84	192 26	520 11	1,931 64
License distribution.....	8,951 44	11,901 18	51,000 81	1,377 35	73,230 78
Total Licenses.....	\$12,647 87	\$12,264 34	\$51,575 77	\$1,910 18	\$78,398 16

STATEMENT OF EXPENDITURES

For the Period July 1, 1938, to March 31, 1939, of the Ninetieth Fiscal Year--Continued

Function	Salaries and wages	Materials and supplies	Service and expense	Property and equipment	Total
Special Items:					
Construction of fish screens.....	\$11,933 84	\$10,470 44	\$754 05	\$1,655 02	\$24,813 35
Construction of research boat.....	2,022 77	314 33	104 28	10,940 63	13,382 01
Construction of Russian River jetty.....				50,000 00	50,000 00
Improvement of office, Ferry Building.....				500 00	500 00
Central Valley Water Project.....	907 74	536 32	107 50	190 8	1,748 37
Total Special Items.....	\$14,864 35	\$11,321 09	\$965 83	\$63,292 4	\$90,443 73
Total 90th fiscal year expenses paid from support appropriations.....					\$1,168,660 84
Prior year 89th fiscal year for support.....					7 28
Total 89th and 90th fiscal year for support.....					\$1,168,668 12
Expenditures for additions and betterments:					
Permanent improvements:					
Purchase of game refuges and public shooting grounds and C. I. E. (Ch. 157-37) 90th fiscal year.....	\$5,824 41	\$11,610 60	\$1,399 09	\$6,963 42	\$27,803 52
Contributions to Employees' Retirement System:					
90th fiscal year.....					\$19,082 37
89th fiscal year.....					2,666 61
Total current biennium.....					\$1,210,221 62
Grand total.....					\$1,210,221 62

GAME CASES

January, February and March, 1939

Offense	Number arrests	Fines imposed	Jail sentences (days)
Antelope: possession, horns and parts of hide.....	1	\$50 00	
Bear: possession bear meat.....	1	50 00	
Commercial gun club, no license.....	1	50 00	
Coots: possession in closed season, taking after 4, overlimit.....	19	105 00	174
Deer: failure to tag, possession spike buck, doe, spot-lighting, possession closed season, possession fawn, allowing dogs to run deer, venison in possession.....	138	4,251 00	3,187½
Doves: no license, overlimit, closed season, shoot from automobile.....	9	190 00	
Ducks: possession in closed season, shoot before 7 a.m., selling ducks, overlimit.....	101	3,618 00	1,505
Firearms: possession in refuge.....	12	150 00	55
False statement obtain license.....	3	75 00	
Geese: overlimit, possession closed season.....	30	462 00	20
Hunting: no license, closed season, at night.....	72	1,025 00	250
Meadowlark: possession.....	2		20
Nongame birds: possession.....	2	75 00	
Pheasants: overlimit, closed season, female.....	29	900 00	225
Plover: possession.....	1		12½
Pigeons: possession, closed season, overlimit.....	3	55 00	
Quail: closed season, no license, possession.....	20	490 00	90
Rabbits: possession cottontails, closed season, hunting brush rabbits no license.....	8	80 00	
Rail: killing.....	1	25 00	
Refuge: taking mammals in refuge.....	4	100 00	
Robin: possession.....	17	340 00	132
Shoot from public road, power boat.....	5	102 50	
Shorebirds: taking.....	4	55 00	
Squirrels: possession.....	3	10 00	37
Swan: possession.....	3	110 00	
Trapping: no license, remove another's traps.....	4	55 00	
Totals.....	493	\$12,543 50	5,703

FISH CASES

January, February and March, 1939

Offense	Number arrests	Fines imposed	Jail sentences (days)
Abalone: overlimit, transporting, using diving apparatus to take.....	45	\$753 00	24
Angling: no license, false statement get license, within 150 feet of closed section, at night, failure to show license, illegal gear, too close to ladder.....	56	1,195 00	10
Bass, striped: undersized, no license, taking between sunset and sunrise, night.....	63	330 00	470
Bluegill: possession.....	2	45 00	
Clams: undersized, Pismo, overlimit.....	68	835 00	337
Cockles: overlimit.....	6	90 00	
Commercial fishing: no license.....	34	1,035 00	20
Crab: possession, undersized.....	11	365 00	60
Crappie: possession closed season.....	1	25 00	
Fyke nets: in closed waters.....	2		120
Gaff hooks: possession within 300 feet of stream, using in fish ladder.....	9	50 00	60
Gill net: operate in closed waters.....	4	125 00	100
Lobsters: closed season, undersized, oversized.....	14	350 00	274
Nets: no license.....	2		20
Oyster: take from private beds.....	3	75 00	
Pollution.....	23	3,325 00	25
Purse seiner: operate in closed waters.....	1		90
Salmon: overlimit, spearing, take with gill net.....	9	200 00	50
Steelhead: possession.....	3	25 00	20
Shoot fish.....	1	50 00	
Set line.....	1	100 00	
Spears: possession within 300 feet of stream, Woodbridge Dam.....	45	310 00	372 1/2
Trout: taking with two poles, explosives, overlimit.....	14	597 00	330
Transfer license.....	2	10 00	5
Totals.....	419	\$9,920 00	2,052 1/2

SEIZURES OF FISH AND GAME

January, February and March, 1939

Fish:		Game:	
Abalone.....	283	Coots.....	11
Bass, striped, lbs.....	2,132	Deer.....	2
Bass, black.....	71	Deer meat, lbs.....	2,556
Bass, black, lbs.....	54 1/2	Deer skin.....	1
Bluegill sunfish.....	41	Deer head.....	1
Clams, Pismo.....	1,122	Doves.....	15
Clams, gaper (horseneck).....	98	Ducks.....	733
Clams, Washington.....	112	Geese.....	15
Cockles.....	567	Mudhens.....	12
Crabs.....	578	Non-game birds.....	3
Crappie.....	2	Pheasants.....	16
Lobsters.....	650	Plover.....	5
Lobsters, lbs.....	64 1/2	Pigeons.....	4
Sturgeon.....	184	Quail.....	17
Sturgeon, roe.....	64	Robins.....	109
Sturgeon, head.....	2	Rabbits.....	15
Steelhead, lbs.....	114 1/2	Sparrows.....	2
Sunfish.....	28	Squirrels.....	1
Traps, lobster.....	29		

FRESH FISH LANDINGS OF CALIFORNIA BOATS

January, 1939

Compiled by the Division of Fish and Game, Bureau of Marine Fisheries

Species	California waters								Waters south international boundary			Total landings of California boats
	*Regions 10 and 20, Del Norte and Eureka	Region 30, Sacramento	Region 40, San Francisco	Region 50, Monterey	Region 60, Santa Barbara	Region 70, Los Angeles	Region 80, San Diego	Total pounds	Region 60, Santa Barbara	Region 70, Los Angeles	Region 80, San Diego	
Anchovy.....				35		17,527		17,562				17,562
Barracuda.....						21	81	102	36,100	57,383	48,173	141,758
Cabezone.....				73				73				73
Cabrilla.....										13,058		13,058
Carp.....		1,303						1,303				1,303
Catfish.....		15,795						15,795				15,795
Cultus, Pacific.....	1,402		10,055	6,138	20	27		17,735				17,735
Flounder, Starry.....	728		6,862	1,181				8,771				8,771
Grouper.....										5,352		5,352
Hake.....			1,050					1,050				1,050
Halibut, California.....			158	2,052	21,200	26,485	13,359	63,254			20,611	83,865
Halibut, Northern.....					10			10				10
Hardhead.....		2,208						2,208				2,208
Herring, Pacific.....			160,650	185		23,460	83	160,835				160,835
Kingfish.....			503	17,169				41,284				41,284
Mackerel, Horse.....				1,091		2,567,525		2,568,616				2,568,616
Mackerel, Pacific.....				22,485	3,422	9,240,394	9,602	9,275,903			382	9,276,285
Mackerel, Spanish.....										5,337		5,337
Mullet.....							1,020	1,020				1,020
Perch.....	12		4,826	1,780	208	7,029		13,855				13,855
Pike.....		17						17				17
Pompano, California.....						2		2				2
Rock Bass.....					2,707	2,304	211	5,282		1,796	994	8,072
Rockfish.....	12,547		47,879	138,256	26,953	37,784	11,432	274,911			2,585	277,496
Sablefish.....	230		600			2,725		3,555				3,555
Salmon.....		18,567						18,567				18,567
Sand Dab.....			34,934	4,051		440		39,425				39,425
Sardine.....		25,404,700	58,723,064	69,491,670	220	48,546,257	38,803	202,204,714				202,204,714
Sculpin.....					78	2,187	5,559	7,824				7,824
Sea-bass, Black.....					1,118	1,650	346	3,123		11,490	13,336	27,949
Sea-bass, White.....				17	2,494	1,870	583	4,464		15	860	5,339
Shark.....	1,333		432,040	427,872	13,096	1,893	557	877,091		128	60	877,279

Sheepshead.....				718	1,166	561	2,448		2,492	4,940		
Skate.....	350		34,916	4,155	2,501	1,302	43,127			43,127		
Smelt.....			20,203	22,188	2,276	17,118	61,789			61,789		
Sole.....	38,925		614,798	29,024	6,550	456	689,772			689,772		
Split-tail.....		1,477					1,477			1,477		
Sucker.....		22					22			22		
Tomcod.....			360				360			360		
Tuna, Bonito.....					70	65,601	20,082	66,056				
Tuna, Skipjack.....									3,615	8,733		
Tuna, Yellowfin.....									186,825	172,500		
Turbot.....			250	1,050					733,412	316,537		
Whitebait.....	9,291		616				1,360			1,360		
Whitefish, Ocean.....					2,185	2,167	9,907			9,907		
Yellowtail.....									480	5,187		
Miscellaneous Fish.....	610		12,795	753	1,418	2,951	5,084		9,388	20,721		
									100			
										18,627		
Crustacean:												
Crab.....	41,700		300,410	139,748			481,858			481,858		
Crab, Rock.....						39	39			39		
Lobster, Spiny.....					11,195	17,594	32,540		300,958	342,498		
Shrimp.....			83,554	474		3,751	84,028			84,028		
Mollusk:												
Abalone.....					3,700	100	3,800			3,800		
Clam, Cockle.....			30			1,791	1,821			1,821		
Clam, Gaper.....			266				266			266		
Clam, Pismo.....				1,019	12,403		13,422			13,422		
Clam, Soft-shell.....	36		7,113				7,149			7,149		
Clam, Washington.....	2,404		250				2,654			2,654		
Octopus.....	72		49	1,226		11	1,358			1,358		
Oyster, Eastern.....	600		12,649				13,249			13,249		
Oyster, Japanese.....			125,588		2,103		127,691			127,691		
Oyster, Native.....			1,965				1,965			1,965		
Squid.....				9,740		11,601	21,344			21,344		
Total pounds.....	110,330	25,444,089	60,638,496	70,323,432	116,657	60,601,261	107,139	217,341,404	36,100	1,028,379	923,129	219,320,012

* The eight geographical regions of the State are as follows:

Regions 10 and 20, Del Norte and Eureka: Del Norte, Humboldt and Mendocino counties.

Region 30, Sacramento: Sacramento and San Joaquin river systems with the delta areas, including Suisun Bay and Lake County.

Region 40, San Francisco: Sonoma, Marin, San Francisco and San Mateo counties, including San Francisco and San Pablo bays.

Region 50, Monterey: Santa Cruz and Monterey counties.

Region 60, Santa Barbara: San Luis Obispo, Santa Barbara and Ventura counties.

Region 70, Los Angeles: Los Angeles and Orange counties.

Region 80, San Diego: San Diego and Imperial counties.

These tables are subject to slight revision due to belated supplemental items.

FRESH FISH LANDINGS OF CALIFORNIA BOATS

February, 1939

Compiled by the Division of Fish and Game, Bureau of Marine Fisheries

Species	California waters								Waters south international boundary			Total landings of California boats
	*Regions 10 and 20, Del Norte and Eureka	Region 30, Sacramento	Region 40, San Francisco	Region 50, Monterey	Region 60, Santa Barbara	Region 70, Los Angeles	Region 80, San Diego	Total pounds	Region 60, Santa Barbara	Region 70, Los Angeles	Region 80, San Diego	
Anchovy			2,075	450		3,200		6,385				6,385
Barracuda					14,557	62,897	6,212	83,666	20,975	68,054	56,423	230,018
Cabezone			98	43				141				141
Cabrilla										8,679		8,679
Carp		130						130				130
Catfish		4,780						4,780				4,780
Cultus, Pacific	6,880		13,505	2,116	38	84	30	22,662				22,662
Flounder, Starry	1,248		45,890	3,611				50,548				50,548
Grouper										3,734	666	4,400
Hake			1,610					1,610				1,610
Halibut, California			2,542	1,230	24,166	44,119	8,803	50,866			34,559	115,425
Halibut, Northern				23				23				23
Hardhead		21						21				21
Herring, Pacific	10,075		78,950	990				90,015				90,015
Kingfish				6,784		63,189	142	50,125				60,125
Mackerel, Horse				9,830		47		9,877				9,877
Mackerel, Pacific				12,764	2,031	10,109	712	25,616				25,616
Mackerel, Spanish										936	943	1,879
Mullet							678	678				678
Perch	13		4,802	67	2,733	1,758		9,433				9,433
Pike		12						12				12
Rock Bass					2,135	5,924	1,004	9,063		3,121		12,184
Rockfish	9,375		75,991	45,899	23,605	35,742	18,262	208,874			19,398	228,272
Sablefish	1,006			225		18,441		19,672				19,672
Salmon		9,642	11,700					21,402				21,402
Sand Dab			53,445	1,617		647		55,709				55,709
Sardine			9,700	84,470		62,500,470	312,290	62,912,930				62,912,930
Sculpin					13	5,939	7,642	13,594				13,594
Sea-bass, Black					1,821	229	45	2,095		6,998	8,542	17,635
Sea-bass, White				105	1,596	356	431	2,488			930	3,418
Shad		1,438						1,438				1,438
Shark	1,423		237,147	68,552	15,828	2,332	1,189	326,471				326,471

Sheepshead.....					50	6,084	232	6,366		287	792	7,445
Skate.....	140		33,361	2,349	3,429	1,867		41,086				41,086
Smelt.....	27		33,518	985	4,207	20,904		59,671				59,671
Sole.....	23,748		721,171	719,981	16,755	928	22	1,482,603				1,482,603
Split-tail.....		318						318				318
Sucker.....		31						31				31
Tuna, Bonito.....						1,753	20	1,775		1,339	759	3,873
Tuna, Skipjack.....										267,104	447,956	715,060
Tuna, Yellowfin.....						50		50		1,185,534	7,274,054	8,459,938
Turbot.....			3,148	760				3,908				3,908
Whitebait.....	27,397		937					28,334				28,334
Whitefish, Ocean.....					1,198	1,390	218	2,506			1,194	4,000
Yellowtail.....										3,587	8,271	11,858
Miscellaneous Fish.....	355		13,502	178	1,045	817		15,997			65	16,062
Crustacean:												
Crab.....	112,802		277,956	50,590				441,648				441,648
Crab, Rock.....						715		715				715
Lobster, Spiny.....					5,241	7,419	2,635	15,298			277,251	292,549
Shrimp.....			54,082	579				54,661				54,661
Mollusk:												
Clam, Cockle.....			20			1,869		1,889				1,889
Clam, Gaper.....			404					404				404
Clam, Pismo.....				3,675	12,962			16,637				16,637
Clam, Soft-shell.....	32		6,604					6,636				6,636
Clam, Washington.....	2,470		327					2,797				2,797
Octopus.....			160	1,788		12		1,960				1,960
Oyster, Eastern.....	3,952		11,173					15,155				15,155
Oyster, Japanese.....			193,848		2,960			196,808				196,808
Oyster, Native.....			1,731					1,731				1,731
Squid.....				235				235				235
Total pounds.....	201,073	16,372	1,889,946	1,020,179	136,393	62,795,303	360,579	66,419,845	20,975	1,550,573	8,131,893	76,123,196

* See footnote to table for January.

FRESH FISH LANDINGS OF CALIFORNIA BOATS

March, 1939

Compiled by the Division of Fish and Game, Bureau of Marine Fisheries

Species	California waters								Waters south international boundary			Total landings of California boats
	*Regions 10 and 20, Del Norte and Eureka	Region 30, Sacramento	Region 40, San Francisco	Region 50, Monterey	Region 60, Santa Barbara	Region 70, Los Angeles	Region 80, San Diego	Total pounds	Region 60, Santa Barbara	Region 70, Los Angeles	Region 80, San Diego	
Anchovy.....			92,895	3,040		3,079		99,014				99,014
Barracuda.....						310,579	78,246	388,825	54,465	26,902	17,575	487,767
Cabezone.....			80	655	166			901				901
Cabrilla.....										6,511		6,511
Carp.....		5,792						5,792				5,792
Catfish.....		26,307						26,307				26,307
Cultus, Pacific.....	57,515		36,124	10,597	369	136		104,741		173		104,914
Flounder, Starry.....	22,283	25	22,948	2,353	68			47,677				47,677
Grouper.....												
Halibut, California.....			2,409	924	28,772	70,895	5,181	108,271		562		562
Hardhead.....		22						22	13,074	28,231		149,576
Herring, Pacific.....	4,400		20,525		971			25,896				25,896
Kingfish.....			590	9,245	60	62,691	76	72,662				72,662
Mackerel, Horse.....				7,837		122,903		130,790				130,790
Mackerel, Pacific.....				34,436	697	883,017	24,506	942,746				942,746
Mackerel, Spanish.....												
Mullet.....										2,082		2,082
Perch.....	1,829		15,041	5,282	7,854	5,839	503	35,845				35,845
Pike.....		64						64				64
Pompano, California.....				9		280		280				280
Rock Bass.....					3,485	8,456	1,975	13,916			593	14,509
Rockfish.....	98,157		70,418	189,092	33,889	75,750	49,950	517,256		40,575		562,309
Sablefish.....	10,022		655	14		26,231		45,922				45,922
Salmon.....		35,588	3,264	7,554				46,406				46,406
Sand Dab.....	12,585		46,390	5,242				65,141				65,141
Sardine.....			1,860	130,095	2,480	33,565,217	278,865	33,978,517				33,978,517
Sculpin.....					283	10,570	6,330	17,492				17,492
Sea-bass, Black.....					1,318	874	45	2,237	200	4,652	32,183	39,272
Sea-bass, Short-fin.....							35	35				35
Sea-bass, White.....				94	13,178	9,595	1,660	24,527		294	4,418	29,239
Shad.....		109,931	470					110,401				110,401
Shark.....	2,983		17,123	5,289	20,457	6,979	1,000	53,831				53,831

Sheepshead.....							199	7,156		407	906	8,469
Skate.....	3,570		21,617	1,438	1,685	3,443		31,753				31,753
Smelt.....	460		36,680	5,878	1,801	13,760	1,263	59,842				59,842
Sole.....	489,036		408,554	44,217	29,543	1,159	987	973,496				973,496
Split-tail.....		466						466				466
Tomcod.....	975		140					1,015				1,015
Tuna, Bluefin.....									10,803			10,803
Tuna, Bonito.....						38,445	423	38,868		5,932		44,800
Tuna, Skipjack.....									597,602	794,547		1,392,149
Tuna, Yellowfin.....									2,048,601	8,872,854		10,921,455
Turbot.....			11,462	350				11,842				11,842
Whitebait.....	20,140		2,468	257				22,865				22,865
Whitefish, Ocean.....					368	2,170		2,538		2,255	1,023	5,816
Yellowtail.....							1,311	1,311		2,558	33,253	37,422
Miscellaneous Fish.....	8,105		9,063		383	1,340		18,891				18,891
Crustacean:												
Crab.....	265,370		362,958	87,574				715,902				715,902
Crab, Rock.....						1,812		1,812				1,812
Lobster, Spiny.....					3,844	2,655	1,896	8,395		179,552		187,947
Shrimp.....			73,974	789				74,763				74,763
Mollusk:												
Abalone.....				129,650	114,262	187		244,099				244,099
Clam, Cockle.....			38			3,243		3,281				3,281
Clam, Gaper.....			423					423				423
Clam, Pismo.....				2,050	14,832			16,921				16,921
Clam, Soft-shell.....	70		6,518					6,507				6,597
Clam, Washington.....	2,722		336					3,058				3,058
Octopus.....	933		1,187	3,928	95			6,143				6,143
Oyster, Eastern.....	1,905		11,863					13,768				13,768
Oyster, Japanese.....			176,862		2,943			179,805				179,805
Oyster, Native.....			1,112					1,112				1,112
Squid.....				68,700			1,455	70,155				70,155
Total pounds.....	1,011,969	178,195	1,456,137	756,708	294,417	35,238,872	456,005	39,382,303	54,665	2,757,361	9,975,545	52,169,894

* See footnote to table for January.

FRESH FISH IMPORTATIONS FROM OTHER STATES AND FOREIGN COUNTRIES

January, 1939

	Gulf of California	Japan
For canneries:		
Tuna, Albacore.....		20,806
For fresh fish markets:*		
Cabrilla.....	830	
Corbina, Mexican.....	2,634	
Sea-bass, Totuava.....	174,170	
Total pounds.....	177,634	20,806

February, 1939

	Gulf of California	Japan
For canneries:		
Tuna, Albacore.....		108,353
Tuna, Skipjack.....		210,050
For fresh fish markets:*		
Cabrilla.....	65	
Corbina, Mexican.....	11,116	
Sea-bass, Black.....	118	
Sea-bass, Totuava.....	426,335	
Miscellaneous Fish.....	26	
Total pounds.....	437,660	318,412

March, 1939

	Gulf of California	Japan
For canneries:		
Tuna, Albacore.....		389,407
Tuna, Skipjack.....		102,852
For fresh fish markets:*		
Cabrilla.....	1,510	
Corbina, Mexican.....	24,528	
Sea-bass, Totuava.....	594,534	
Total pounds.....	620,572	492,259

* This record includes only that fish which is voluntarily reported to the Division of Fish and Game and does not represent all importations.



BUREAU OF HYDRAULICS

JOHN SPENCER, Chief	San Francisco
Clarence Elliger, Assistant Hydraulic Engineer	San Francisco
Byron Wittorff, Assistant	San Francisco

BUREAU OF LICENSES

H. R. DUNBAR, Chief	Sacramento
J. J. Shannon, License Agent	Sacramento
L. O'Leary, License Agent	San Francisco
R. Nickerson, License Agent	Los Angeles

BUREAU OF PATROL

E. L. MACAULAY, Chief of Patrol	San Francisco
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CENTRAL DISTRICT (Headquarters, Sacramento)

LaRue Chappell, Inspector in Charge	Sacramento
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Northern Division

Jos. H. Sanders, Captain in Charge	Sacramento
Don Chipman, Warden, Flying Squad	Dunsmuir
Wm. La Marr, Warden, Flying Squad	Nevada City
Eugene Durney, Assistant Warden, Flying Squad	Sacramento
A. H. Willard, Captain	Nevada City
A. A. Jordan, Captain	Redding
Chas. Sibeck, Warden, Launch <i>Perch</i>	Sacramento
L. M. Booth, Assistant Warden, Launch <i>Perch</i>	Sacramento
E. J. Johnson, Warden, Plumas County	Quincy
L. E. Mercer, Warden, Butte County	Chico
Taylor London, Warden, Colusa County	Colusa
Albert Sears, Warden, El Dorado County	Placerville
E. C. Vail, Warden, Glenn County	Willows
C. O. Fisher, Warden, Lassen County	Susanville
Don Davison, Warden, Modoc County	Alturas
Earl Hiscox, Warden, Nevada County	Nevada City
Nelson Poole, Warden, Placer County	Auburn
J. E. Hughes, Warden, Sacramento County	Sacramento
H. S. Vary, Warden, Sacramento County	Sacramento
Earl Caldwell, Warden, Shasta County	Burney
Chas. Love, Warden, Shasta County	Redding
A. Granstrom, Warden, Sutter County	Yuba City
Brice Hammack, Warden, Siskiyou County	Yreka
Fred R. Starr, Warden, Siskiyou County	Dorris
W. J. Black, Warden, Solano County	Suisun
R. W. Anderson, Warden, Tehama County	Red Bluff
C. L. Gourley, Warden, Trinity County	Weaverville
R. L. Sinkey, Warden, Yolo County	Woodland
R. A. Tinnin, Warden, Yuba County	Browns Valley
R. E. Tutt, Warden, Sierra County	Downieville

Southern Division

S. R. Gilloon, Captain in Charge	Fresno
J. W. Thornburg, Warden, Flying Squad	Tracy
John O'Connell, Captain	Stockton
E. O. Wraith, Captain	Bakersfield
R. J. Little, Warden, Amador County	Jackson
L. R. Garrett, Warden, Calaveras County	Murphys
F. A. Bullard, Warden, Fresno County	Reedley
Paul Kehrer, Warden, Fresno County	Fresno
Lester Arnold, Warden, Kern County	Bakersfield
Roswell Welch, Warden, Kern County	Kernville
Ray Ellis, Warden, Kings County	Hanford
H. E. Black, Warden, Madera County	Madera
Gilbert T. Davis, Warden, Mariposa County	Mariposa
M. S. Clark, Warden, Merced County	Merced
C. S. Donham, Warden, Merced County	Gustine
Wm. Hoppe, Warden, San Joaquin County	Lodi
Geo. Magladry, Warden, Stanislaus County	Modesto
R. J. Bullard, Warden, Tulare County	Porterville
W. I. Long, Warden, Tulare County	Visalia
F. F. Johnston, Warden, Tuolumne County	Sonora

COAST DISTRICT (Headquarters, San Francisco)

K. P. Allred, Inspector in Charge	San Francisco
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Northern Division

W. J. Harp, Captain in Charge	Ukiah
R. Remly, Warden, Flying Squad	Willits
J. D. Dondero, Captain	Eureka
Henry Lencioni, Captain	Santa Rosa
Ray Diamond, Warden, Del Norte County	Crescent City
John Hurley, Warden, Humboldt County	Eureka
W. F. Kallher, Warden, Humboldt County	Fortuna
Scott Feland, Warden, Lake County	Lakeport
R. J. Yates, Warden, Marin County	San Rafael
Ovid Holmes, Warden, Mendocino County	Fort Bragg
Leo Mitchell, Warden, Mendocino County	Point Arena
J. W. Harbuck, Warden, Napa County	Napa
Bert Laws, Warden, Sonoma County	Petaluma
Victor Von Arx, Warden, Sonoma County	Santa Rosa

Southern Division

Wm. Lippincott, Captain in Charge	San Francisco
Owen Mello, Warden, Flying Squad	San Jose
O. P. Browelow, Captain	Alameda
Captain	Salinas
C. L. Bundock, Warden, Alameda County	Oakland
Ed Clements, Warden, Contra Costa County	Martinez
Orben Philbrick, Warden, Monterey County	King City
F. H. Post, Warden, Monterey County	Salinas
J. P. Vassiere, Warden, San Benito County	Hollister
Lee C. Shea, Warden, San Francisco County	San Francisco
F. W. Hecker, Warden, San Luis Obispo County	San Luis Obispo
C. E. Peck, Warden, San Mateo County	San Mateo
C. E. Holladay, Warden, Santa Clara County	San Jose
F. J. McDermott, Warden, Santa Cruz County	Santa Cruz

Marine Fisheries Detail (Coast District)

Ralph Classic, Captain	Monterey
Kenneth Hooker, Warden, <i>Cruiser Albatross III</i>	San Francisco
Nathan Rogan, Assistant Warden, <i>Cruiser Albatross III</i>	San Francisco
C. Apsey, Assistant Warden, <i>Launch Sturgeon</i>	Martinez
Leslie B. Loh, Warden	Eureka
Charles Mayfield, Warden	Monterey
G. R. Smalley, Warden	Richmond
Ralph Miller, Warden	San Francisco
Charles Holzhauser, Warden	Watsonville

SOUTHERN DISTRICT (Headquarters, Los Angeles)

C. S. Pander, Inspector in Charge	Los Angeles
E. H. Ober, Captain, Special Duty	Los Angeles

Western Division

, Captain in Charge	Los Angeles
Theo. Jolley, Warden, Flying Squad	Los Angeles
Walter Shannon, Warden, Flying Squad	Los Angeles
Earl Mackinn, Captain	Santa Barbara
L. T. Ward, Captain	Escondido
James Loundagin, Warden, Imperial County	Brawley
Fred Albrecht, Warden, Los Angeles County	Los Angeles
W. L. Hare, Warden, Los Angeles County	San Fernando
Walter Emerick, Warden, Orange County	Santa Ana
E. H. Clidden, Warden, San Diego County	San Diego
A. R. Ainsworth, Warden, Santa Barbara County	Santa Maria
R. E. Bedwell, Warden, Santa Barbara County	Santa Barbara
G. N. Johnson, Warden, Ventura County	Ventura

Eastern Division

H. C. Jackson, Captain in Charge	San Bernardino
A. L. Stager, Warden, Flying Squad	San Bernardino
, Captain	Bishop
, Captain	Banning
E. L. Walker, Warden, Inyo County	Bishop
C. J. Walters, Warden, Inyo County	Independence
Al Crocker, Warden, Mono County	Bridgeport
J. H. Gyger, Warden, Riverside County	Perris
R. C. O'Conner, Warden, Riverside County	Banning
W. C. Malone, Warden, San Bernardino County	San Bernardino
W. S. Talbott, Warden, San Bernardino County	Big Bear Lake

Marine Fisheries Detail (Southern District)

C. H. Groat, Captain in Charge	Terminal Island
Lars Weseth, Master, M. V. N. B. Scofield	Terminal Island
Walter Engelke, Master, M. V. Bluefin	Terminal Island
Howard V. Shebley, Warden, Cruiser Bonito	Santa Barbara
Kenneth Webb, Assistant Warden, Cruiser Bonito	Santa Barbara
John Spicer, Warden, Cruiser Broadbill	Santa Monica
John Barry, Assistant Warden, Cruiser Broadbill	Santa Monica
Warden, Cruiser Marlin	San Diego
Niles Millen, Assistant Warden, Cruiser Marlin	San Diego
Carmi Savage, Warden, Cruiser Tuna	Avalon
B. J. Avise, Assistant Warden, Cruiser Tuna	Avalon
E. R. Hyde, Warden, Cruiser Yellowtail	Balboa
L. R. Metzgar, Assistant Warden, Cruiser Yellowtail	Balboa
Lester Golden, Warden	Arroyo Grande
T. J. Smith, Warden	San Diego
E. A. Chan, Warden	Terminal Island
Donald Glass, Warden	Terminal Island
Erol Greenleaf, Warden	Terminal Island
N. C. Kunkel, Warden	Terminal Island
Tate F. Miller, Warden	Terminal Island
T. W. Schilling, Warden	Terminal Island
L. G. Van Vorhis, Warden	Terminal Island

POLLUTION DETAIL

Paul Shaw, Chemist in Charge	San Francisco
C. L. Towers, Warden	Los Angeles
Jack McKerlie, Warden	Oakland
J. A. Reutgen, Assistant Warden, Launch Rainbow	Stockton
R. Schoen, Warden	Terminal Island
H. A. Erwick, Assistant Warden	Terminal Island
E. A. Johnson, Assistant Warden	Terminal Island

CALIFORNIA JUNIOR GAME PATROL

M. F. Joy, Warden, Superintendent Junior Game Patrol	San Francisco
Geo. D. Seymour, Assistant, Junior Game Patrol	San Francisco

MARINE PATROL AND RESEARCH

Motor Vessel N. B. Scofield, Terminal Island
Motor Vessel Bluefin, Terminal Island
Cruiser Yellowtail, Newport Harbor
Cruiser Broadbill, Santa Monica
Cruiser Quinnat III, San Francisco
Cruiser Bonito, Santa Barbara
Cruiser Marlin, San Diego
Cruiser Tuna, Avalon
Launch Rainbow, Stockton
Launch Shrapnel, Lakeport
Launch Sturgeon, Martinez
Launch Perch, Sacramento